SUZO HAPP

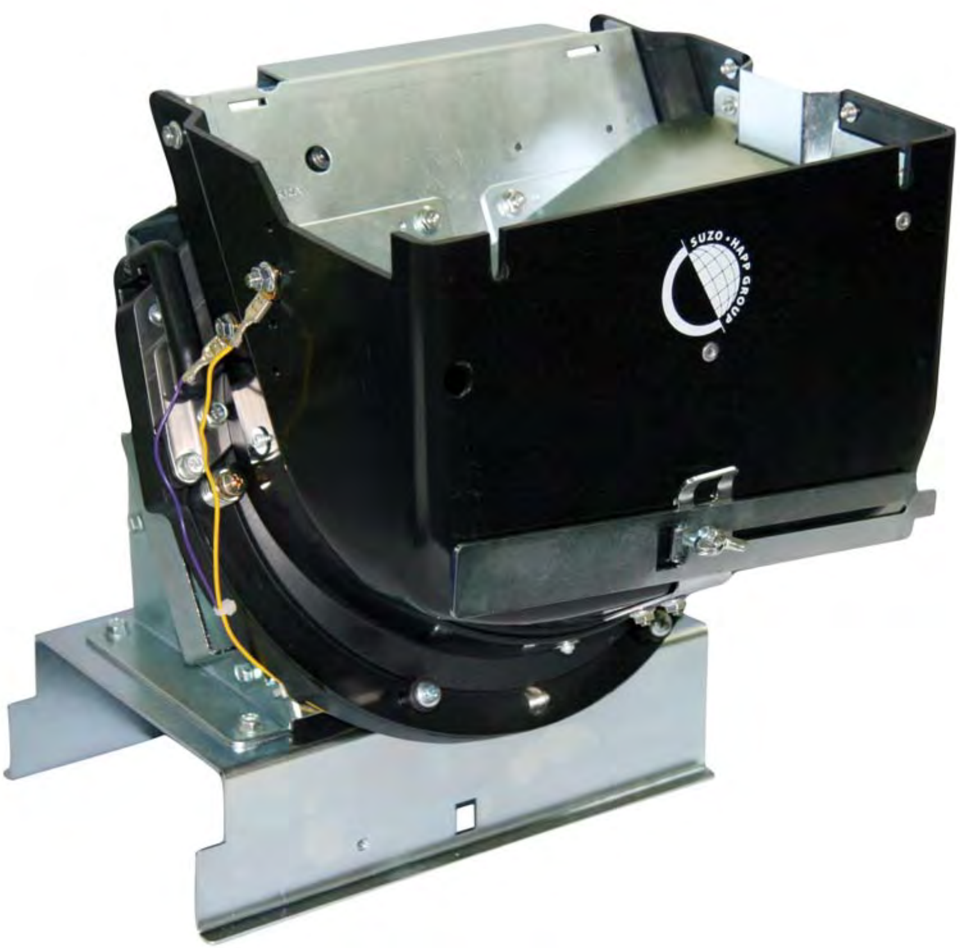
GAMING, AMUSEMENT AND INDUSTRIAL COMPONENTS

SERVICE MANUAL

excel™ hopper

FOR

BB2™



Rev. 01

Date: 091108

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Section I Introduction

Nearly 30 years of designing and manufacturing Casino Hoppers has resulted in this new product.

Suzo ® a world leader in coin handling equipment and well know for its Cube Hopper ® and Gold Series hopper ® now presents the Excel Hopper ®. Understanding the needs of both casinos and slot machine manufacturers has led to this extremely durable and World's most service friendly Casino hopper!

Section II New Features

New features:

Planetary gearbox system provides the following advantages:

- Maximum torque with minimal power consumption.
- Standard 24VDC
- Silent Operation.
- Unique bayonet connection for easy and economical motor replacement.

Standard optical read out sensing coin presences :

The first sensor is operated by the coin pushing a mechanical lever to interrupt an optical sensor.

The output method available for your control board is:

- Standard: Indirect optical read out. Part Number 14-1145

The second sensor is standard for WMS Gaming and works by the coin breaking a beam of infrared light.

This sensor adds an additional security level to prevent coin stealing.

- Second read out located in the coin exit.
- Optics protected by cover against light (fraud) and dust.

Other features:

- Easy accessible coin exit.
- Steel bearing offer stable disc rotation.
- Customized frame and cup specifications.
- All wear and tear parts such as pin and shelf wheel are 100% compatible with older generations STC hoppers.
- Software displays version on power up by blinking Green Led for units and Red Led for tenths. Software version also displayed on label next to PCB.
- Snap type transparent plastic cover provides protection against liquid spills.
- Tilt Bracket designed for use when filling coins to prevent hopper from tipping over yet Tilt Bracket can easily be moved out of way when sliding hopper into cabinet.
- Easy access to adjust thickness setting for coin wiper to allow only one coin on knife.
- Large coin hoppers have clutch to help reduce coin jams.
- Large coin hopper has jumper selection to help provide second try in clearing coin jams.

- Applicable coin size Diameter: 19-38mm.
- Applicable coin size Thickness: 1.5-3.8mm.

Approximate Pay out speed: **<**31mm coins: Up to 450 coins per minute
>31mm coins: Up to 250 coins per minute

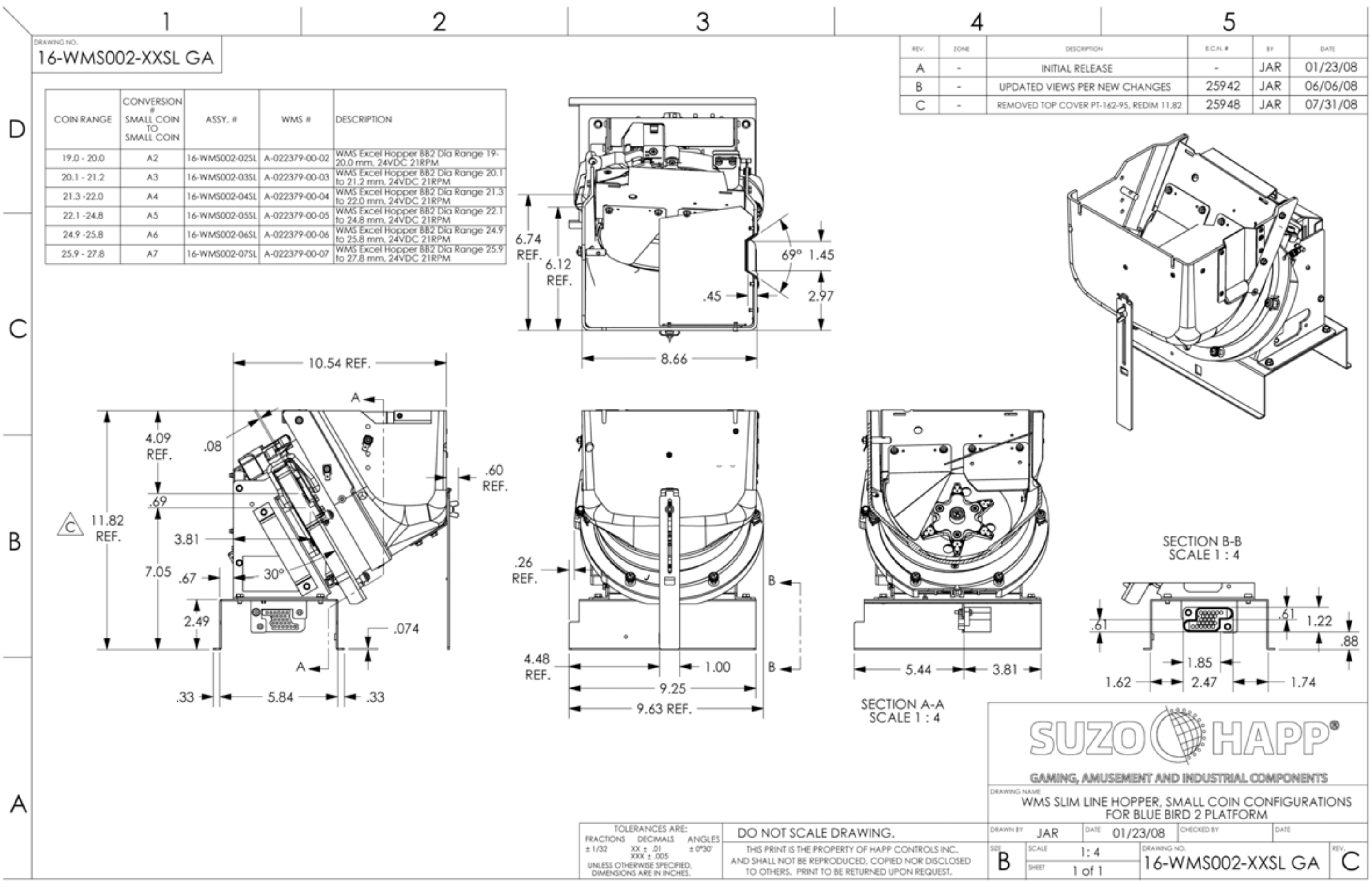
Control boards: (optional)
Part no. 14-0530-5 intelligent control board 12 or 24Vdc with logic Lo start mode.
.
For field replacements contact factory.

Section III HOPPER CONFIGURATIONS

Complete Hopper		**Min. Dia.**	**Max Dia**						
WMS Part No.	**Suzo Happ No.**	**Coin (mm)**	**Coin (mm)**	**Shelf Wheel**	**Pin Wheel**	**Knife**	**Outlet Cover**	**Bowl**	**Stir**
A-022379-00-02	16-WMS002-02SL	19	20	14-0130-1465	14-0116	14-0281	14-0065	845	
A-022379-00-03	16-WMS002-03SL	20.1	21.2	14-0130-1465	14-0116	14-0281	14-0065	845	
A-022379-00-04	16-WMS002-04SL	21.3	22	14-0130-1425	14-0116	14-0281	14-0065	845	
A-022379-00-05	16-WMS002-05SL	22.1	24.8	14-0130-1370	14-0115	14-0281	14-0065	845	
A-022379-00-06	16-WMS002-06SL	24.9	25.8	14-0130-1350	14-0115	14-0281	14-0065	845	
A-022379-00-07	16-WMS002-07SL	25.9	27.8	14-0130-1310	14-0115	14-0281	14-0065	845	
A-022379-00-08	16-WMS002-14SL	27.9	31	14-0130-1235	14-0115	14-0296	14-0067	855	**x**
A-022379-00-09	16-WMS002-15SL	31.1	31.9	14-0130-1235	14-0112	14-0296	14-0067	855	**x**
A-022379-00-10	16-WMS002-16SL	32	33	14-0130-1205	14-0112	14-0296	14-0067	855	**x**
A-022379-00-11	16-WMS002-17SL	33.1	35	14-0130-1165	14-0112	14-0296	14-0067	855	**x**
A-022379-00-12	16-WMS002-18SL	35.1	36.9	14-0130-1125	14-0112	14-0296	14-0067	855	**x**
A-022379-00-13	16-WMS002-19SL	37	38	14-0130-1075	14-0112	14-0296	14-0067	855	**x**

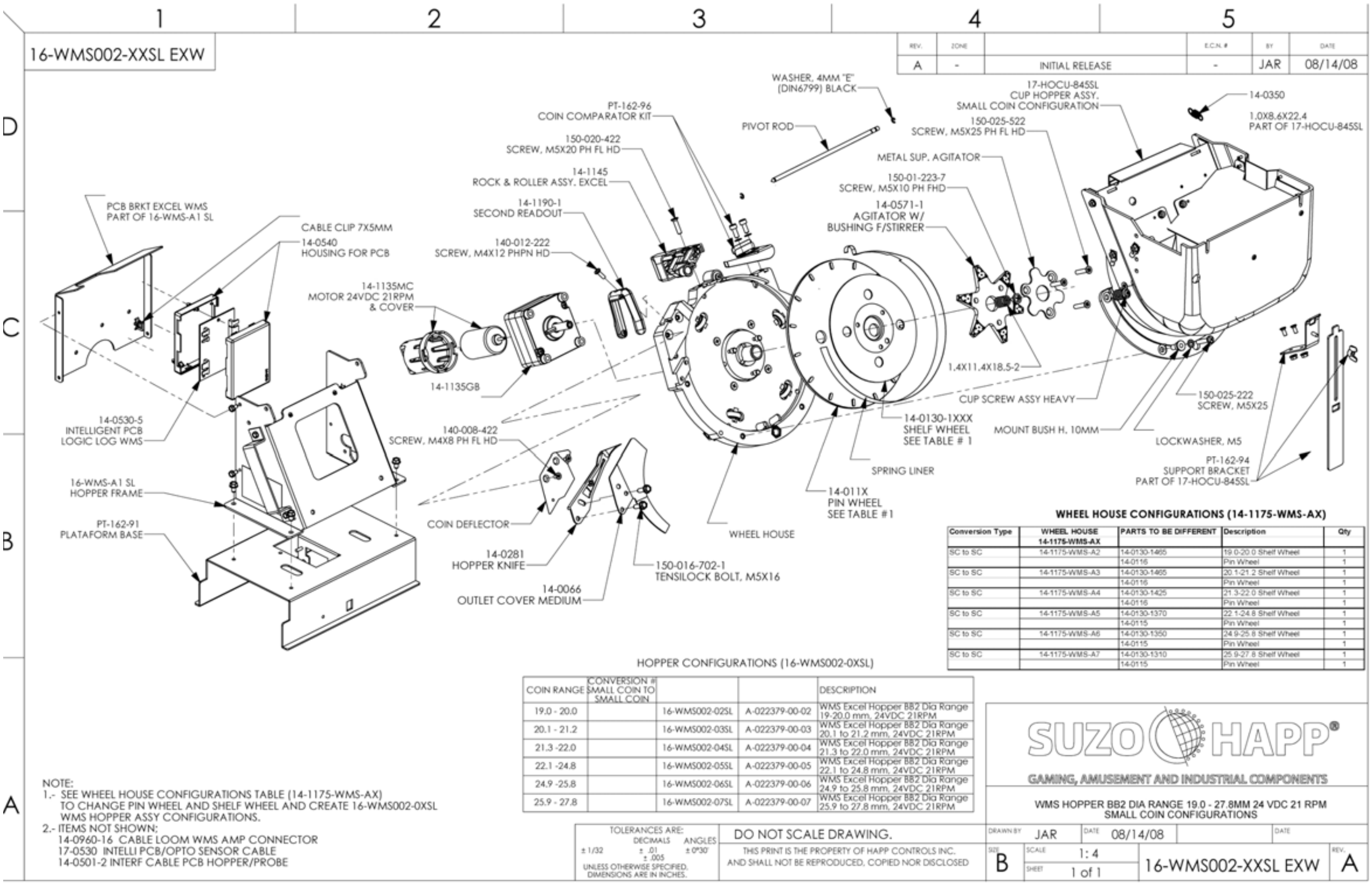
NOTES:

Section IV General Assembly Drawing Small Coin



NOTES:

Section V Exploded Drawing Small Coin



WHEEL HOUSE CONFIGURATIONS (14-1175-WMS-AX)

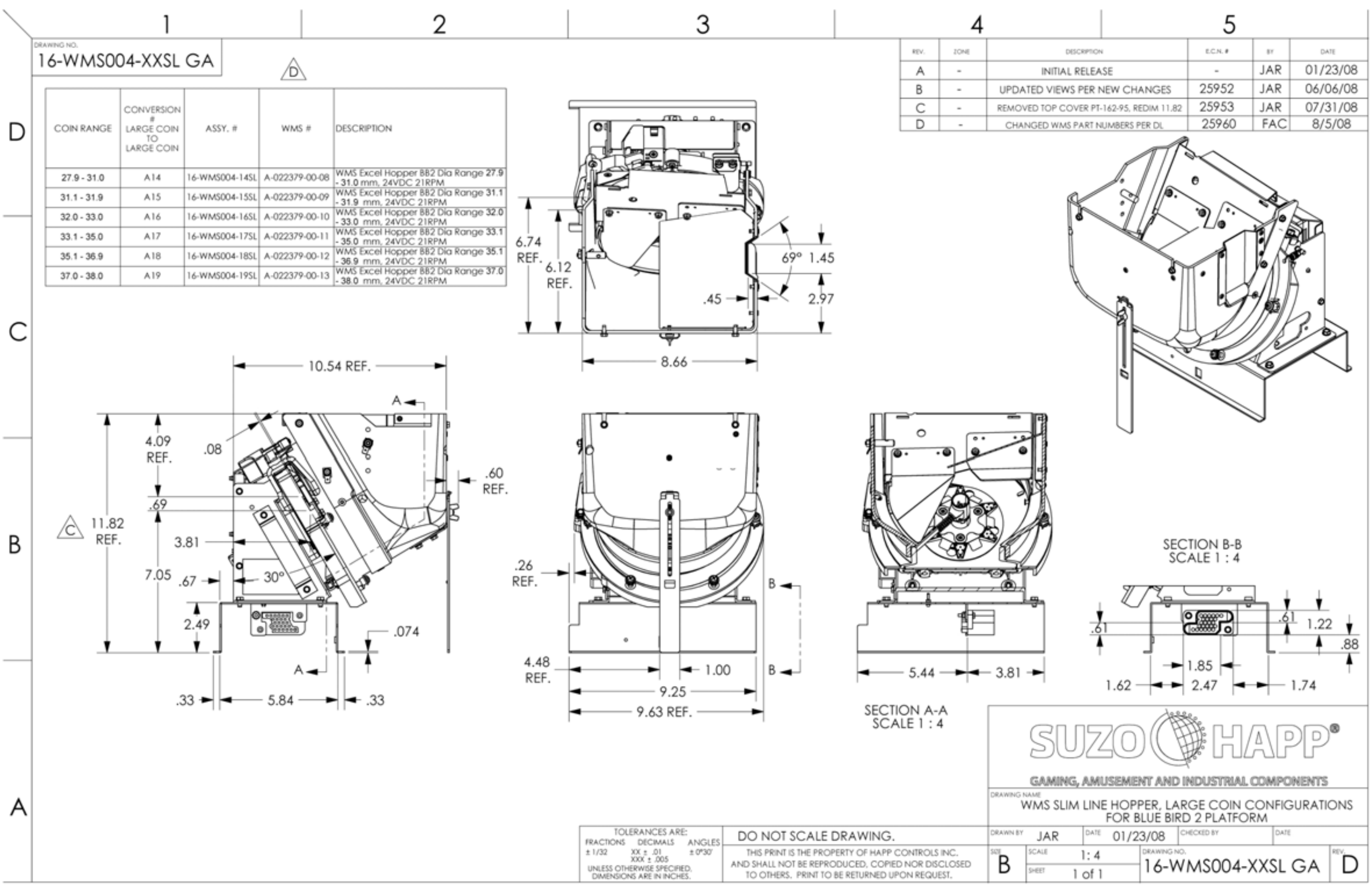
Conversion Type	WHEEL HOUSE 14-1175-WMS-AX	PARTS TO BE DIFFERENT	Description	Qty
SC to SC	14-1175-WMS-A2	14-0130-1465	19.0-20.0 Shelf Wheel	1
		14-0116	Pin Wheel	1
SC to SC	14-1175-WMS-A3	14-0130-1465	20.1-21.2 Shelf Wheel	1
		14-0116	Pin Wheel	1
SC to SC	14-1175-WMS-A4	14-0130-1425	21.3-22.0 Shelf Wheel	1
		14-0116	Pin Wheel	1
SC to SC	14-1175-WMS-A5	14-0130-1370	22.1-24.8 Shelf Wheel	1
		14-0115	Pin Wheel	1
SC to SC	14-1175-WMS-A6	14-0130-1350	24.9-25.8 Shelf Wheel	1
		14-0115	Pin Wheel	1
SC to SC	14-1175-WMS-A7	14-0130-1310	25.9-27.8 Shelf Wheel	1
		14-0115	Pin Wheel	1

HOPPER CONFIGURATIONS (16-WMS002-0XSL)

COIN RANGE	CONVERSION # SMALL COIN TO SMALL COIN			DESCRIPTION
19.0 - 20.0		16-WMS002-02SL	A-022379-00-02	WMS Excel Hopper BB2 Dia Range 19-20.0 mm, 24VDC 21RPM
20.1 - 21.2		16-WMS002-03SL	A-022379-00-03	WMS Excel Hopper BB2 Dia Range 20.1 to 21.2 mm, 24VDC 21RPM
21.3 -22.0		16-WMS002-04SL	A-022379-00-04	WMS Excel Hopper BB2 Dia Range 21.3 to 22.0 mm, 24VDC 21RPM
22.1 -24.8		16-WMS002-05SL	A-022379-00-05	WMS Excel Hopper BB2 Dia Range 22.1 to 24.8 mm, 24VDC 21RPM
24.9 -25.8		16-WMS002-06SL	A-022379-00-06	WMS Excel Hopper BB2 Dia Range 24.9 to 25.8 mm, 24VDC 21RPM
25.9 - 27.8		16-WMS002-07SL	A-022379-00-07	WMS Excel Hopper BB2 Dia Range 25.9 to 27.8 mm, 24VDC 21RPM

NOTES:

Section VI General Assembly Drawing Large Coin



COIN RANGE	CONVERSION # LARGE COIN TO LARGE COIN	ASSY. #	WMS #	DESCRIPTION
27.9 - 31.0	A14	16-WMS004-14SL	A-022379-00-08	WMS Excel Hopper BB2 Dia Range 27.9 - 31.0 mm, 24VDC 21RPM
31.1 - 31.9	A15	16-WMS004-15SL	A-022379-00-09	WMS Excel Hopper BB2 Dia Range 31.1 - 31.9 mm, 24VDC 21RPM
32.0 - 33.0	A16	16-WMS004-16SL	A-022379-00-10	WMS Excel Hopper BB2 Dia Range 32.0 - 33.0 mm, 24VDC 21RPM
33.1 - 35.0	A17	16-WMS004-17SL	A-022379-00-11	WMS Excel Hopper BB2 Dia Range 33.1 - 35.0 mm, 24VDC 21RPM
35.1 - 36.9	A18	16-WMS004-18SL	A-022379-00-12	WMS Excel Hopper BB2 Dia Range 35.1 - 36.9 mm, 24VDC 21RPM
37.0 - 38.0	A19	16-WMS004-19SL	A-022379-00-13	WMS Excel Hopper BB2 Dia Range 37.0 - 38.0 mm, 24VDC 21RPM

REV.	ZONE	DESCRIPTION	E.C.N. #	BY	DATE
A	-	INITIAL RELEASE	-	JAR	01/23/08
B	-	UPDATED VIEWS PER NEW CHANGES	25952	JAR	06/06/08
C	-	REMOVED TOP COVER PT-162-95, REDIM 11.82	25953	JAR	07/31/08
D	-	CHANGED WMS PART NUMBERS PER DL	25960	FAC	8/5/08

NOTES:

Section VII Exploded Drawing Large Coin

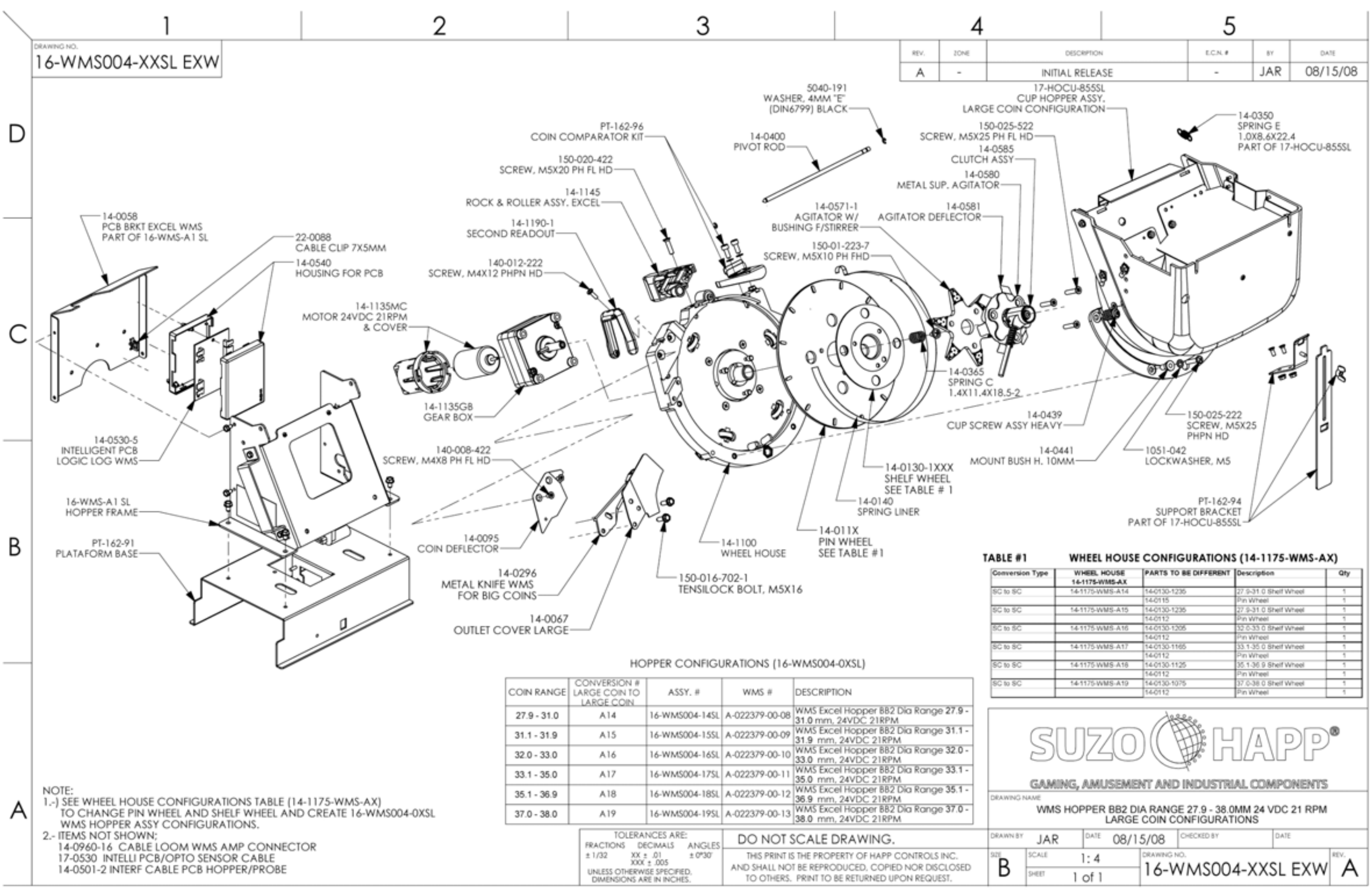


TABLE #1 WHEEL HOUSE CONFIGURATIONS (14-1175-WMS-AX)

Conversion Type	WHEEL HOUSE 14-1175-WMS-AX	PARTS TO BE DIFFERENT	Description	Qty
SC to SC	14-1175-WMS-A14	14-0130-1235	27.9-31.0 Shelf Wheel	1
		14-0115	Pin Wheel	1
SC to SC	14-1175-WMS-A15	14-0130-1236	27.9-31.0 Shelf Wheel	1
		14-0112	Pin Wheel	1
SC to SC	14-1175-WMS-A16	14-0130-1205	32.0-33.0 Shelf Wheel	1
		14-0112	Pin Wheel	1
SC to SC	14-1175-WMS-A17	14-0130-1165	33.1-35.0 Shelf Wheel	1
		14-0112	Pin Wheel	1
SC to SC	14-1175-WMS-A18	14-0130-1125	35.1-36.9 Shelf Wheel	1
		14-0112	Pin Wheel	1
SC to SC	14-1175-WMS-A19	14-0130-1075	37.0-38.0 Shelf Wheel	1
		14-0112	Pin Wheel	1

HOPPER CONFIGURATIONS (16-WMS004-0XSL)

COIN RANGE	CONVERSION # LARGE COIN TO LARGE COIN	ASSY. #	WMS #	DESCRIPTION
27.9 - 31.0	A14	16-WMS004-14SL	A-022379-00-08	WMS Excel Hopper BB2 Dia Range 27.9 - 31.0 mm, 24VDC 21RPM
31.1 - 31.9	A15	16-WMS004-15SL	A-022379-00-09	WMS Excel Hopper BB2 Dia Range 31.1 - 31.9 mm, 24VDC 21RPM
32.0 - 33.0	A16	16-WMS004-16SL	A-022379-00-10	WMS Excel Hopper BB2 Dia Range 32.0 - 33.0 mm, 24VDC 21RPM
33.1 - 35.0	A17	16-WMS004-17SL	A-022379-00-11	WMS Excel Hopper BB2 Dia Range 33.1 - 35.0 mm, 24VDC 21RPM
35.1 - 36.9	A18	16-WMS004-18SL	A-022379-00-12	WMS Excel Hopper BB2 Dia Range 35.1 - 36.9 mm, 24VDC 21RPM
37.0 - 38.0	A19	16-WMS004-19SL	A-022379-00-13	WMS Excel Hopper BB2 Dia Range 37.0 - 38.0 mm, 24VDC 21RPM

NOTES:

Section VIII Specifications

Power Consumption:

Voltage	Unloaded	Loaded	Stall auto reverse
24VDC	0.25 Amp	0.50 Amp	1.5 Amp

Maximum torque of the motor

- 24V - 21RPM load 12kg N-m

Environmental Specifications:

Operating temperature: 0° to + 60°C
Storage temperature: -10° to + 65°C

Mechanical Dimensions:

Front (looking at Blind Mate Connector pin side) 12.14 " x side 9.63" x height11.82".
Refer to General Assembly drawing in front of manual.
Weight: 16.9 lbs.

Electrical Connections:

1. Connector: 25 Pin Blind Mate
2. Pin 1 Hopper Full: Diode protected. Active state: Ground. Supplied by Hopper.
3. Pin 4 Hopper On: CMOS TTL Levels: Low 0-0.8VDC, high 2.0-5.2 VDC. Active state (Motor On): Low. opto coupled Input.
4. Pin 7 Hopper Coin Count: Open collector output to ground opto coupled. Active State: Ground. Supplied by Hopper. Valid coin count is 26ms pulse, Jam > 250ms.
5. Pin 12 Power: 24 VDC.
6. Pin 21 Frame Ground
7. Pin 23 Ground
8. Pin 25 Ground

Note: Pin 23 and 25 are tied together.

Section IX Maintenance

Periodic maintenance

(Warning: Before removing or installing the hopper make sure that power is switched off!)

Tools Required for Service:

12 Inch long Shaft Phillips Screw Driver for M5 screws PH1 Tip
4 Inch long Shaft Phillips Screw Drive for M5 screws PH1 Tip
7 Inch Needle Nose Pliers
8 mm socket driver
7 mm socket driver
4 mm Allan wrench
5 mm Flat Tip Screw Driver with 4 mm tip

Maintenance recommended in six months interval.

1. Clean the optical sensor with can air. Use air spray can Suzo Happ part number 29-1900-00.
2. Clean the hopper knife and remove all dirt, especially on the route of coins, on the shelf wheel, the pinwheel around the area of the pins, the coin outlet, plastic bowl and metal parts in the bowl. Refer Section XI on how to remove bowl.

Inspection, recommended once a year. Refer to Section XI for Disassembly and Assembly Instructions.

1. Disassemble the coin cup from the hopper, in case of a non-metal cup check for any cracks or breaks. Refer to section XI for disassembly and assembly.
2. Inspect the hopper knife for wear and the correct position! For adjustments see fig.1 in section X.
3. Inspect the hopper wiper for the correct position. The position of the wiper is very important for a correct payout! If necessary adjust it, see fig. 2 of section X of this manual.
4. Inspect the rubber agitator.
5. Inspect the coin level probe is securely fastened.
6. Inspect cable harness for damage and if necessary secure the cables.
7. Assemble coin cup with the 4 screws, springs and bushings back on the wheelhouse. The two springs go over the bushings and are inserted into the hole at the top of each side of the hopper bowl.
8. Inspect if the hopper slides gently in and out of the slot machine. Check the hopper and connector for proper function.

Warning!

Do not use any kind of lubrication on the hopper.

After inspection and maintenance check the function of the hopper. For testing using the test mode of the slot- machine.

Consult the manual or the slot-manufacturer for further instructions.

Section X Adjustments

Adjustments of the excel hopper. For knife adjustment must remove Coin Bowl from wheel housing. Refer to section XI steps 1 and 2 only.

Adjustment of the hopper knife

Loosen the two screws “A” move the tip of the knife against the pinwheel and the top of the shelf wheel. Lightly hold the knife on the shelf wheel and tighten the two screws “A” 5.5 Newton’s. Rotate the pinwheel and check there is no space between the shelf wheel and the knife in any position. Note Outlet cover not shown.

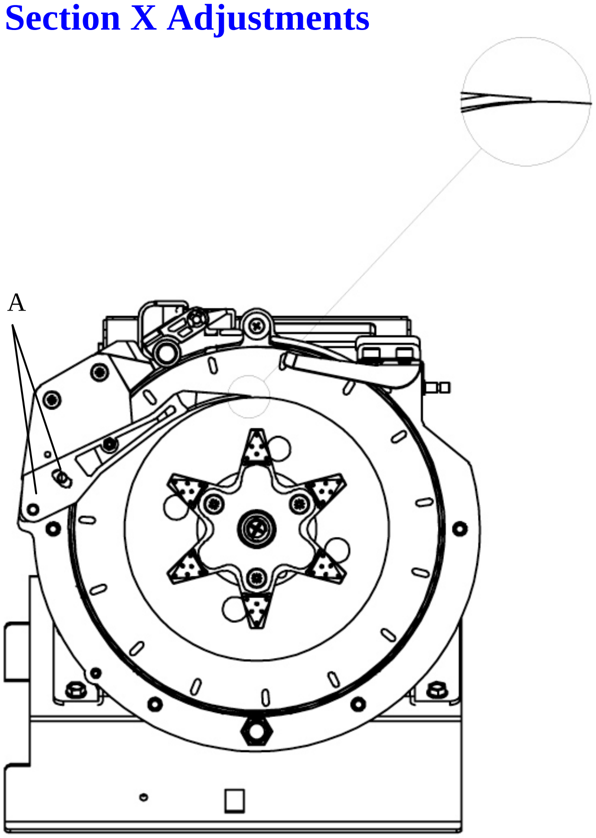


Fig: 1



Fig: 2

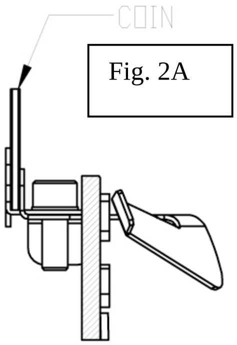


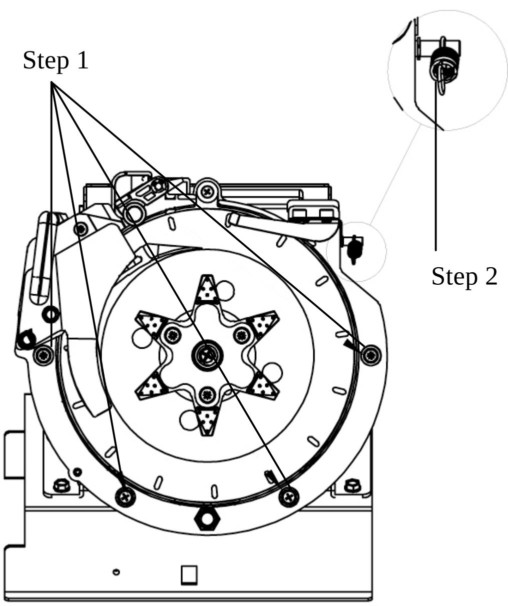
Fig. 2A

Adjustment of the coin-wiper
You do not have to remove the bowl to make this adjustment

Referring to Figure 2A slightly loosen the two Allan screws at the top of the hopper. Position a coin in the coin wiper comparator. Keep the back of the wiper edge up against the wheel housing while moving the front of the wiper up against the coin sandwiching it between the two wiper plates. Do not sandwich the coin too tight. The coin should be able to roll back and forth. Tighten the two Allan screws. Do not over tighten. This will adjust the wiper to be approximately 0,5 mm (.019”) from the coin.

Check:
When adjusted properly the coin should move freely under the wiper. A second coin laying on top of the first coin should get wiped off the first coin when both try to pass under the wiper.

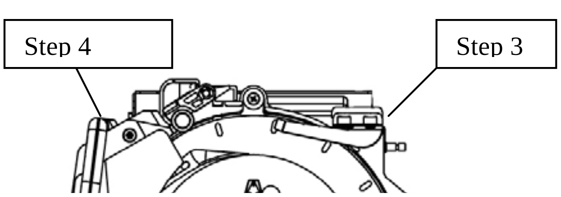
Section XI Disassembling And Assembling The Hopper.



Disassembling the hopper.

1. Remove the yellow wire from probe terminal on side of hopper and remove purple wire from ground terminal on side of hopper. (Ground terminal is connected to back metal plate and is closes to horseshoe shaped sensor). Remove the 4 screws, which holds the hopper cup to the wheel housing. Note: The springs surrounding the screws are on top. The bottom screws only have bushings.

2. Remove the hopper cup and spring which is mounted on the right side of pivot pin.



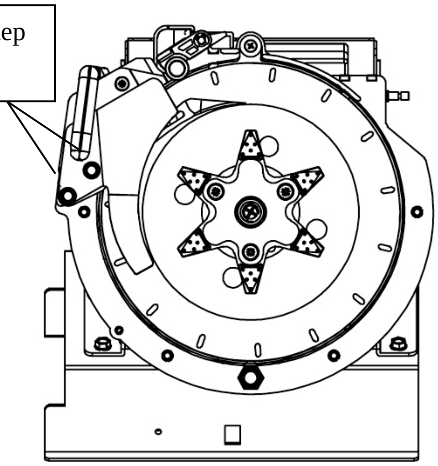
—

3. Remove the 2 Allan screws, which holds the wiper, and remove the wiper. Refer to section XI for assembly and setup. Store parts together.

4. Remove the screw from the top of the second sensor. Carefully remove the second sensor.

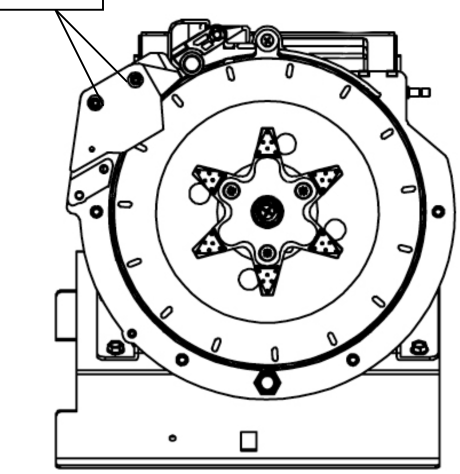
5. Remove the 2 hexagon bolts, which holds the coin chute, and remove the coin chute and knife.

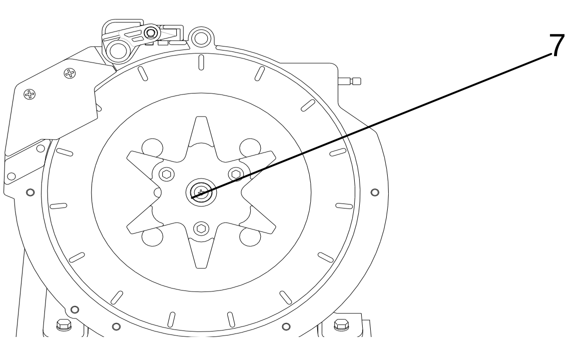
Step 5



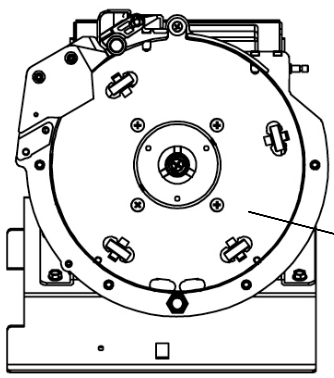
6. Remove the 2 Philips screws, which holds the coin deflector, and remove the coin deflector.

Step 6

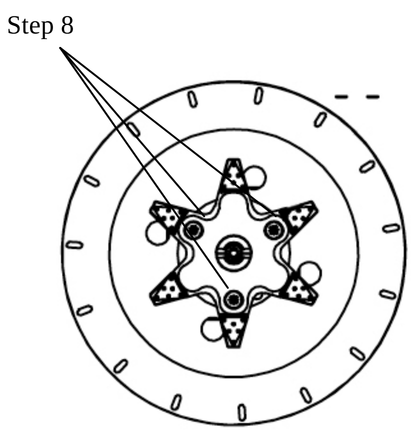




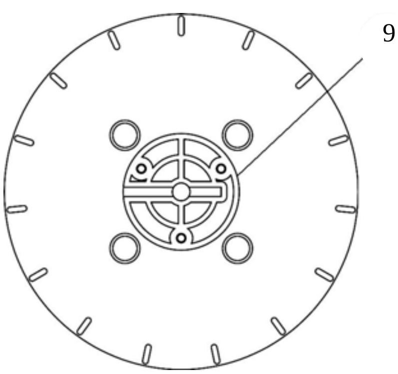
7. Remove the Philips screw, and spring in the centre of the disc.



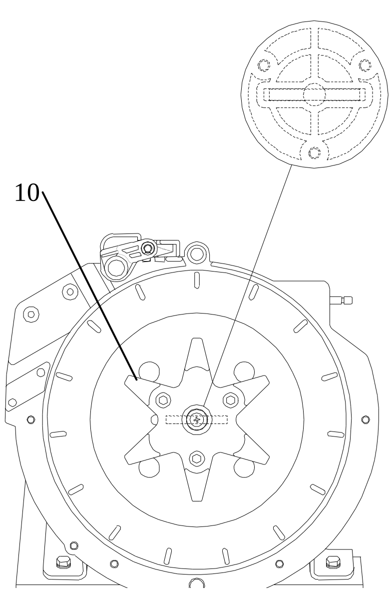
8. The disc assembly is now free floating in the hopper, remove the assembly by pulling on the agitator and lift it from the motor shaft. If a clutch is installed (coins >27.9 mm) then it must be removed first by loosening the 3 set screws at the base of the clutch. Do not remove the set screws. The clutch will pull straight off.
(Disc assembly removed)



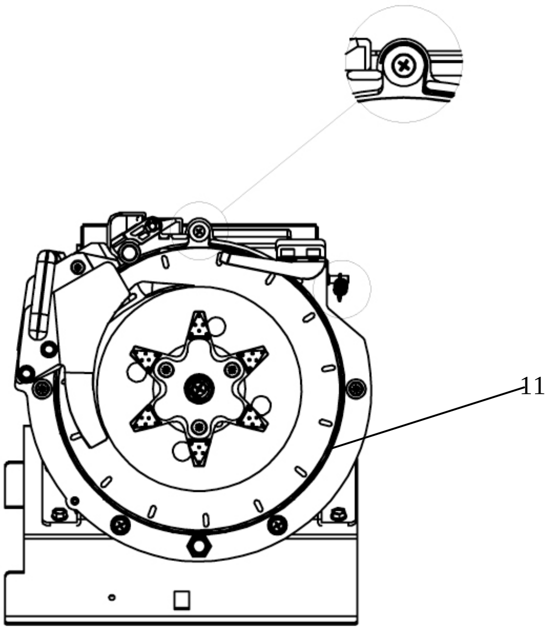
8. Remove the 3 screws, and disassemble the whole disc assembly to make the new requested combination.



9. Take requested pinwheel, shelf-wheel, agitator and agitator support plate and mount the 3 screws back in position. Do not over tighten.



10. Put the disc assembly back on the hopper. The disc only fits 2 ways into the driver pin.



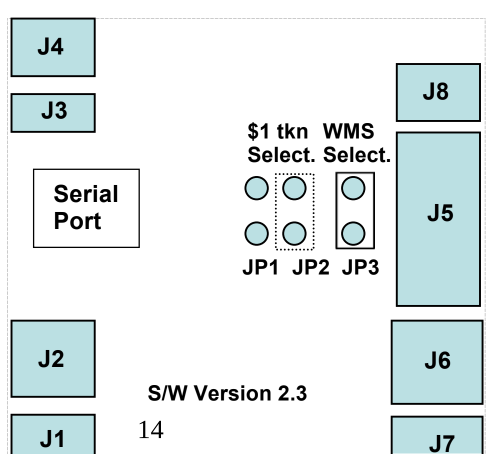
11. Place the spring liner in position around the disc, make sure the end of the spring liner fits correctly in the upper part on the wheel housing.

    Finish the assembling by reversing step 5, 4, 3, 2 and 1 of the disassembling description. Be careful not to damage the spring liner. Do not over tighten the screws.

Section XII Jumper Settings

The jumpers are located on the PCB, to have access to the PCB remove the hex head screw at the top of handle side of the hopper.

1) Jumper on JP 3 must always be connected between the two pins as shown below.
This jumper enables the hopper to run in WMS Gaming Machines.
2) Jumper on JP 2 is only connected between the two pins as shown when using a large coin hopper for coins 27.9 mm or larger otherwise the jumper may be connected to only one pin. When JP 2 is implemented the hopper takes a little longer to clear coins because of there size by reversing the disc when a jam occurs.
3) Jumper JP 1 is reserved.



Section XIII Conversion Options

To convert a hopper from one coin to another, select the size under the description and order the kit part number to the left.

Legend:
SC to SC: Small Coin to Small coin. A small coin has a diameter less than27.9 mm.
LC to LC: Large Coin to Large coin. A large coin has a diameter larger than 27.8 mm.
Note:
1) Only purchase a large coin bowl assembly when converting a small coin hopper to a large coin hopper.
2) Only purchase a Small Coin Bowl Assembly when converting a large coin hopper to a small coin hopper.

Conversion Type	Kit Part Number to be ordered	BOM	Description	Qty
SC to SC	**14-1175-WMS-A2**	14-0130-1465	19.0-20.0 Shelf Wheel	1
		14-0116	Pin Wheel	1
SC to SC	**14-1175-WMS-A3**	14-0130-1465	20.1-21.2 Shelf Wheel	1
		14-0116	Pin Wheel	1
SC to SC	**14-1175-WMS-A4**	14-0130-1425	21.3-22.0 Shelf Wheel	1
		14-0116	Pin Wheel	1
SC to SC	**14-1175-WMS-A5**	14-0130-1370	22.1-24.8 Shelf Wheel	1
		14-0115	Pin Wheel	1
SC to SC	**14-1175-WMS-A6**	14-0130-1350	24.9-25.8 Shelf Wheel	1
		14-0115	Pin Wheel	1
SC to SC	**14-1175-WMS-A7**	14-0130-1310	25.9-27.8 Shelf Wheel	1
		14-0115	Pin Wheel	1
Conversion Type	Kit Part Number	BOM	Description	QTY

Large Coin Bowl Assembly SC to LC Bowl Assy	**14-1175-WMS-A8**	14-0296	Knife	1
		14-0067	Outlet Cover	1
		14-0585	Clutch	1
		14-0581	Agitator Deflector	1
		14-0580-1	Metal Support Agitator	1
		150-025-522	M5x25 Scw PH FH HD	3
		16-HOCU-855	Large Hopper Cup Assembly	1
Conversion Type	Kit Part Number	BOM	Description	Qty
LC to LC	**14-1175-WMS-A14**	14-0130-1235	27.9-31.0 Shelf Wheel	1
		14-0115	Pin Wheel	1
LC to LC	**14-1175-WMS-A15**	14-0130-1235	31.1-31.9 Shelf Wheel	1
		14-0112	Pin Wheel	1
LC to LC	**14-1175WMS-A16**	14-0130-1205	32.0-33.0 Shelf Wheel	1
		14-0112	Pin Wheel	1
LC to LC	**14-1175-WMS-A17**	14-0130-1165	33.1-35.0 Shelf Wheel	1
		14-0112	Pin Wheel	1
LC to LC	**14-1175-WMS-A18**	14-0130-1125	35.1-36.9 Shelf Wheel	1
		14-0112	Pin Wheel	1
LC to LC	**14-1175-WMS-A19**	14-0130-1075	37.0-38.0 Shelf Wheel	1
		14-0112	Pin Wheel	1
Conversion Type	Kit Part Number	BOM	Description	Qty
Small Coin Bowl Assembly LC to SC Bowl Assy	**14-1175-WMS-A20**	14-0580	Metal Star Support Agitator	1
		150-025-522	M5X20 Scw Button HD	3
		16-HOCU-845	Small Hopper Cup Assembly	1
		14-0065	Outlet Cover	1
		14-0281	Knife	1

Section XIV Theory of Operation

Upon power up if you were looking at the PCB you will see the green LED blink twice and the red LED blink 3 times. This is the version of software being implemented at the time this manual was being printed and is version number 2.3. This must correspond with the label next to the PCB located on the PCB Bracket of the hopper.

The game controls the running of the hopper by sending a low signal to the hopper and as long as the second sensor is not blocked the hopper will start to run until either the game tells it to stop or a jam has occurred.

There are two sensors that the coins pass when exiting the hopper. The first one provides the count and the second one make sure that the exit coin path is clear. In the event the coin path at the second sensor becomes obstructed the hopper will shut down however, if cleared within two seconds it will restart to continue to pay out the correct number of coins. After two seconds the hopper will have to receive a new start signal from the game and the jam must be cleared before sending the start signal.

If a jam occurs in the bowl the hopper will try to clear it by moving the disc backward and forward for approximately 8 - 12 seconds depending on if you have a small coin hopper or large coin hoper then stopped if not cleared. The process continues with each new start signal until the jam is cleared. In some case it maybe necessary to remove the jam manually.

If the hopper does not pay out a coin in 15 seconds the game will shut off the hopper.

GAMING, AMUSEMENT AND INDUSTRIAL COMPONENTS

WWW.HAPP.COM or WWW.SUZO.COM

Design and specifications are subject to change without prior notice.

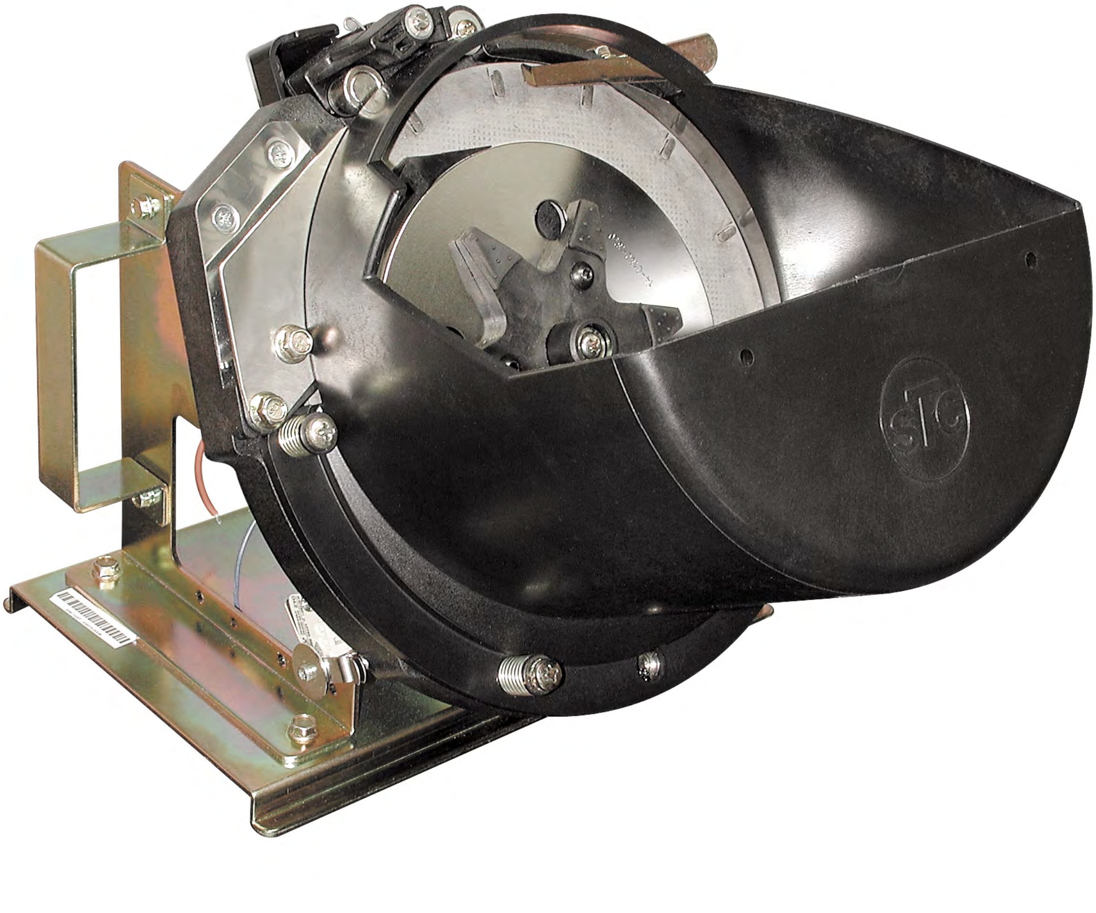
Please make sure you are using the correct configuration for the size of the coins needed for the hopper, combination of pinwheel, shelfwheel, etc.

In case of doubt, do not hesitate to contact
SUZO HAPP GROUP for advice!
Tel: 1 (847) 593 6161 is USA   Tel: +31 186 643333, in Europe The Netherlands

SERVICE MANUAL

excel™ hopper

Version 1.3



Developed by Suzo International

excel hopper Service manual

Nearly 25 years of designing and manufacturing Casino Hoppers has resulted in this new product.
Understanding the needs of both casinos and Slot machine manufacturers has led to this extremely durable and World's most service friendly Casino hopper!

New features:

Planetary gearbox system provides following advantages:
- Maximum torque by minimal power consumption.
- Available in 12 or 24VDC
- Silent Operation.
- Unique bayonet connection for easy and economical motor replacement.

Standard optical read out:
- Indirect optical read out. NPN, normally open (n/o).
- Optional: Indirect optical read out. NPN, normally closed (n/c).
- Optional: Second read out in the coin exit.
- Optics protected by cover against light (fraud) and dust.

Other features:
- Easy accessible coin exit.
- Steel bearing offer stable disc rotation.
- Customised frame and cup specifications possible.
- All wear and tear parts such as pin and shelf wheel are 100% compatible with older generations STC hoppers.
- Easy to integrate for manufacturers who use older generation STC casino Hoppers.
- Applicable coin sizes: 18-38mm – Optional up to 45mm.

Pay out speed: **<**31mm coins: 450 coins per minute
>31mm coins: 250 coins per minute

All Excel hoppers can be supplied with customised wiring, with choice of strobe pins for low and / or high level detection

Control boards: (optional)
Part no. 14-0500-1 intelligent control board 24Vdc with direct start mode, logic Hi start mode, pulse mode and RS232 serial mode.
Part no. 14-0500-2 intelligent control board 24Vdc with direct start mode, logic Lo start mode, pulse mode and RS232 serial mode.
Part no. 14-0505-1 intelligent control board 12Vdc with direct start mode, logic Hi start mode, pulse mode and RS232 serial mode.
Part no. 14-0505-1 intelligent control board 12Vdc with direct start mode, logic Hi start mode, pulse mode and RS232 serial mode.
Part no. 14-0500-4 anti-jam control board 24Vdc to solve most of the possible coin jams during operation.

Periodic maintenance
(Warning: Before removing or installing the hopper make sure that power is switched off!)

Maintenance recommended in six months interval.
1. Clean the optical sensor.
2. Clean the hopper knife and remove all dirt, especially on the route of coins, on the shelf wheel, the pinwheel around the area of the pins and the coin outlet.

Inspection, recommended once in a year
1. Disassembling the coin cup of the hopper, in case of a non-metal cup check for any cracks or brakes.
2. Inspect the hopper knife for wearing and the correct position! For adjustments see fig.1
3. Inspect the hopper wiper for the correct position.
   The position of the wiper is very important for a correct payout! If necessary adjust it, see fig. 2
4. Inspect the rubber agitator.
5. Inspect the coin level, check the moment of the switch or check if the coin level probe is securely fastened.
6. Inspect cabling harness for damage, and if necessary tighten cables back on the harness.
7. Assembling coin cup with the 4 screws, springs and bushings back on the wheelhouse.
8. Inspect if the hopper slides gently in and out of the slot machine. Check the hopper and connector for proper function.

Warning!
Do not use any kind of lubrication on the hopper.
After inspection and maintenance check the function of the hopper. For testing using the test mode of the slot- machine.
Consult the manual or the slot-manufacturer for further instructions.

Power Consumption:

Voltage	Unloaded	Loaded	Stall auto reverse
• 24VDC	0.25 Amp	0.50 Amp	1.5 Amp
• 12VDC	0.30 Amp	0.70 Amp	1.6 Amp

Maximum torque of the motor
- 24V - 31RPM load 6kg N-m   12V - 31RPM load 5kg N-m
- 24V - 21RPM load 12kg N-m   12V - 21RPM load 11kg N-m

Operating temperature: -10° to + 60°C
This service manual is intended only to assist the reader in the use of this product.
Therefore Suzo international shall not be held liable for any loss or damage whatsoever arising from the use of any information or particulars in or any comission from this manual or any incorrect use of the product.

Adjustments of the excel hopper

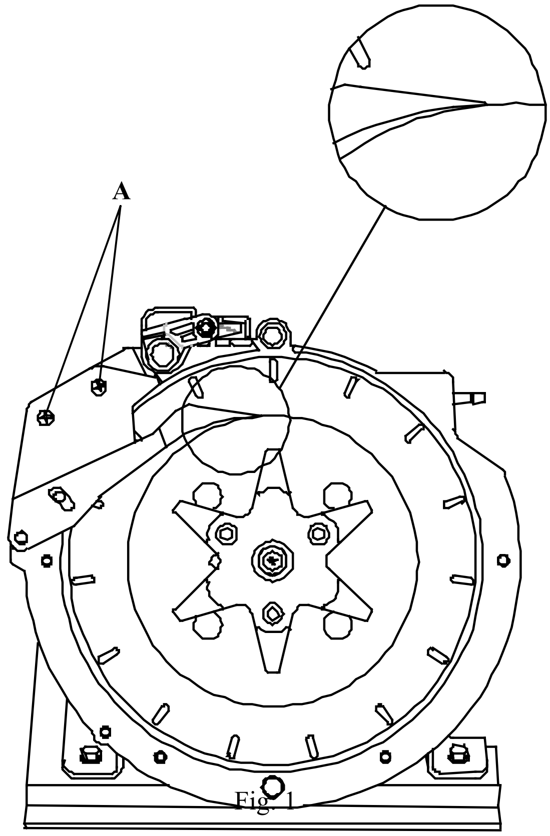


Fig. 1

Adjustment of the hopper with standard knife

Loosen the two screws “A” move the tip of the knife against the pinwheel and the top of the shelfwheel. Lightly hold the knife on the shelfwheel and tighten the two screws “A”. Rotate the pinwheel and check there is no space between the shelfwheel and the knife in any position.

Adjustment of the hopper with full metal knife

Loosen the two screws “A” move the tip of the knife against the pinwheel and the top of the shelfwheel. Turn the pinwheel at least one cycle and tighten the two screws “A”. Rotate the pinwheel and shelfwheel and the knife in any position.

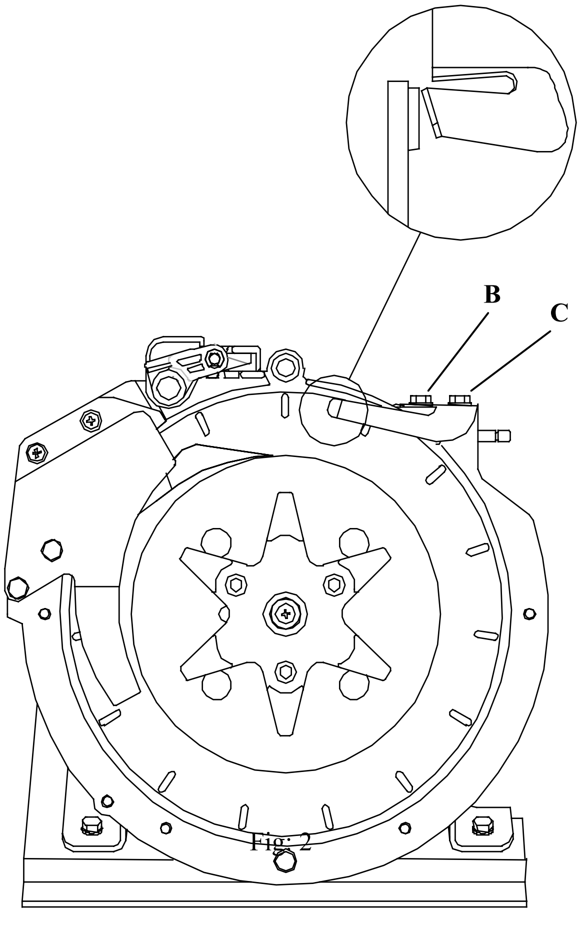


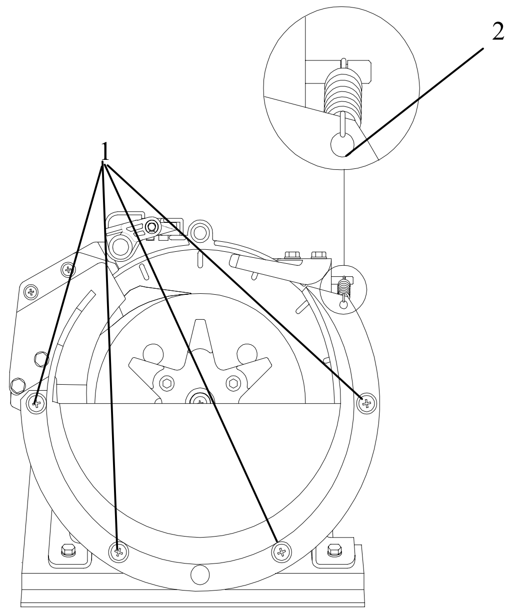
Fig. 2

Adjustment of the coin-wiper

Position a coin under the wiper, make sure that the top of the wiper is equal to the top of the coin.
Slightly loosen the two screws “B and C” - see fig 2.
Move the wiper edge up to the coin. The edge should be close to the coin, app. 0,5 mm.
Never let the wiper touch the coin!

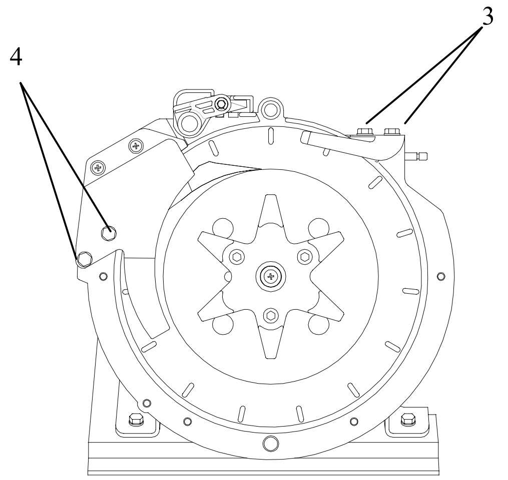
Tighten first the screw “B”, constantly checking the position of the wiper to the coin.
Tighten screw “C” and check the final position.
Do not over-tighten the screws B en C!

Disassembling the hopper.



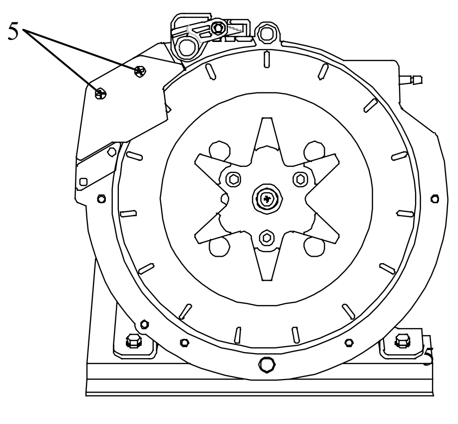
1. Remove the 4 screws, which holds the hopper cup to the wheelhousing.

2 Remove the hopper cup and spring which is mounted on the right side of pivot pin.

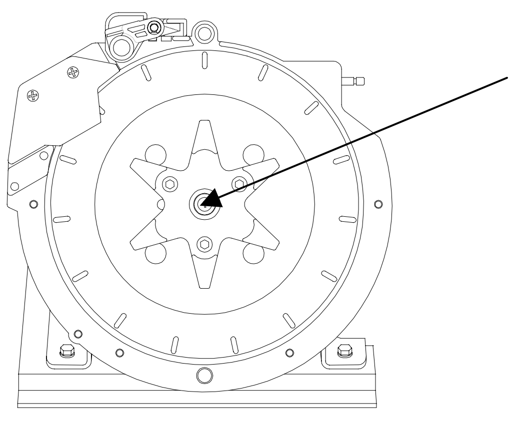


3. Remove the 2 hexagon bolts, which holds the wiper, and remove the wiper.

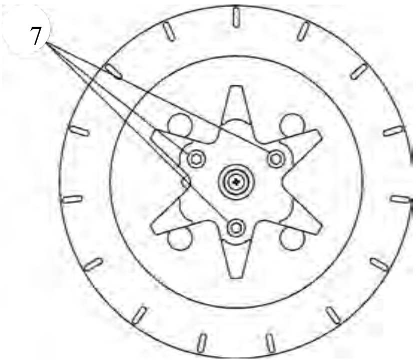
4. Remove the 2 hexagon bolts, which holds the coin chute, and remove the coin chute and knife.



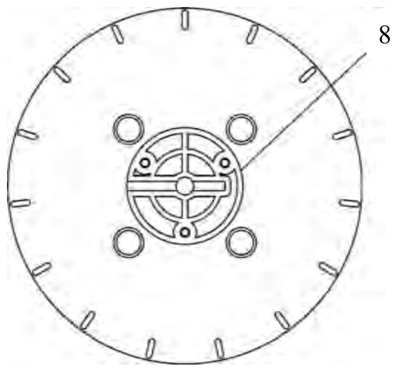
5. Remove the 2 Philips screws, which holds the coin deflector, and remove the coin deflector.



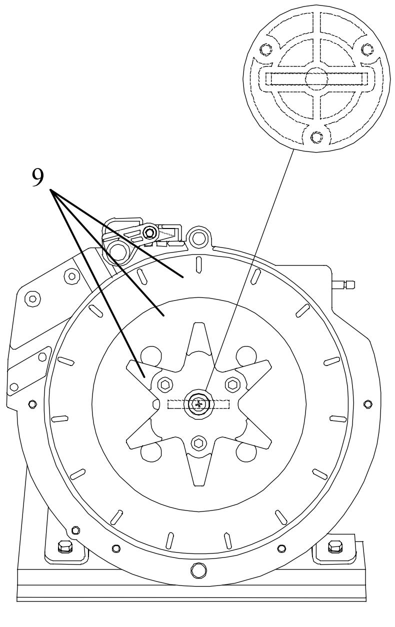
6. Remove the Philips screw, and spring in the centre of the disc. The disc assembly is now free floating in the hopper, remove the assembly by pulling on the agitator and lift it from the motor shaft.



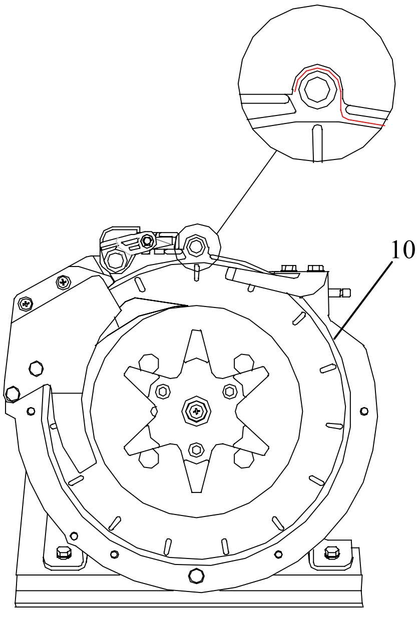
7. Remove the 3 hex key screws, and disassemble the whole disc to make the new requested combination.



8. Take requested pinwheel, shelf-wheel and agitator, and mount the 3 screws back in position.



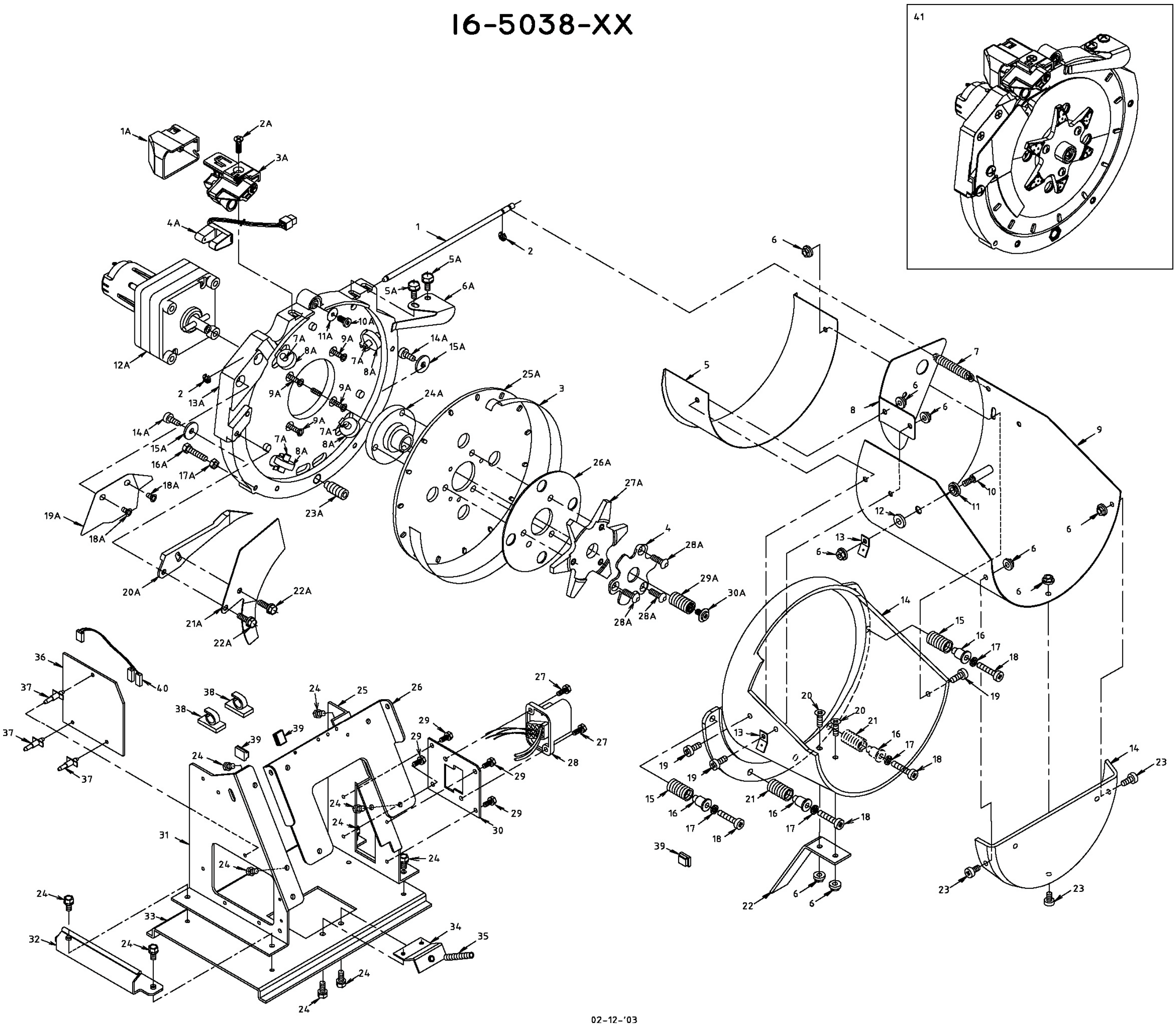
9. Put the disc assembly back on the hopper.
The disc only fits 2 ways into the driver pin.



10. Place the spring liner in position around the disc, make sure the end of the spring liner fits correct in the upper part on the wheelhousing.

Finish the reassembling by reversing step 5, 4, 3, 2 and 1 of the disassembling description.

16-5038-XX



16-5038-XX Version 1.0								2-12-2003
DRAW. NR.	PART NUMBER	DESCRIPTION	PCS	DRAW. NR.	PART NUMBER	DESCRIPTION	PCS	
1	14-0400	PIVOT ROD	1	22	14-0075	SCOOP SUPPORT BRACKET	1	
2	5040-191	E WASHER BLACK (DIN 6799)	2	23	150-010-120	M5X10 SCREW PHILL. PAN HD YELLOW	3	
3	14-0140	SPRING LINER	1	24	250-008-700-7	M5X8 BOLT HX. HD. TAPT. FL. YELLOW	10	
4	SEE PART LIST G	METAL STAR SUPPORT AGITATOR	1	25	14-0025	RIGHT SIDE MOUNTING BRACKET	1	
5	SEE PART LIST H	CUP LINER	1	26	14-0035	PIVOT BRACKET	1	
6	1050-242	M5 TENSILOCK NUT	9	27	240-010-700-7	M4X10 BOLT HX. HD. TAPT FL. YELLOW	2	
7	14-0345	EXTENSION SPRING	1	28	14-0960-14	CABLE LOOM AINS	1	
8	14-0085	COIN BAFFLE	1	29	240-008-700-7	M4X8 BOLT HX. HD. TAPT FL. YELLOW	4	
9	14-0890-1	MEDIUM SCOOP EXTENSION AINS	1	30	14-1022	CONNECTOR BRACKET AMP 12 PINS	1	
10	14-0470	LEVELSENSOR PIN	1	31	14-0015	LEFT SIDE MTG BRACKET	1	
11	0052-276	ISOLATION SLEEVE 5.2X7.9X1	1	32	14-0051	BOTTOM GRIP	1	
12	0081-006	ISOLATION WASHER 8.1X14X1	1	33	14-0009	PLATFORM 2MM	1	
13	61-2257-31	TAB 6.3MM BRASS HOLE 5.3MM 45GR	2	34	14-0045	SPRING MOUNT	1	
14	14-0720-6	HOPPER CUP 2 PCS STANDARD BLUE	1	35	14-0355	COMPRESSION SPRING	1	
15	14-0365	SPRING HEAVY	2	36	14-0500-1	HOPPER CONTROL BOARD	1	
16	14-0440	MOUNT	4	37	22-0087	PCB HOLDER	3	
17	1051-040	M5 EXT. STAR LOCKWASHER YELLOW	4	38	22-0068-1	SELF ADHESIVE CABLE CLIP 6MM	2	
18	150-025-220	M5X25 SCREW PHILL. PAN HD YELLOW	4	39	22-0068-3	SELF ADHESIVE WIRE CLIP 6X2MM	3	
19	150-012-120	M5X12 SCREW PHILL. PAN HD YELLOW	3	40	14-0501-2	INTERF.CABLE FOR PCB HOPPER PROBE	1	
20	150-012-420	M5X12 SCREW PHILL.FLAT HD YELLOW	2	41	14-1175*	EXCEL WHEELHOUSE ASSEMBLY	1	
21	14-0335	SPRING LIGHT	2					

* SEE LIST 14-1175

14-1175

Version 1.0 — 07-11-2003

DRAW. NR.	PART NUMBER	DESCRIPTION	PCS	DRAW. NR.	PART NUMBER	DESCRIPTION	PCS
1A	14-1155	SENSOR COVER	1	16A	150-025-700	M5X25 BOLT HX. HD. YELLOW	1
2A	150-020-422	M5X20 SCREW PH.FL.HD.	1	17A	1050-050	M5 NUT HEX. YELLOW	1
3A	14-1145	ROCK AND ROLLER ASSY	1	18A	140-008-420	M4X8 SCREW PH. FL. HD. YELLOW	2
4A	14-1140	OPTO SENSOR	1	19A	14-0095	COIN DEFLECTOR	1
5A	150-012-700-1	M5x12 TENSILOCK BOLT YELLOW	2	20A	14-0281 (PartB)	HOPPER KNIFE	1
6A	14-0070	WIPER	1	21A	14-0065 (PartC)	OUTLET COVER	1
7A	14-0416	BEARING PIN	4	22A	15-016-700-1	M5X16 TENSILOCK BOLT YLLOW	2
8A	14-0590	BEARING 6X19X6MM	4	23A	199-025-040	M10X25 SCREW HX.HD. IMBUS	1
9A	150-050-422	M5x50 FL.HD.MOTOR SCREW	4	24A	14-0110	DRIVING HUB	1
10A	240-008-220	M4X8 SCREW PH. PAN. HD.YELLOW	1	25A	14-0115 (PartD)	PINWHEEL 15 PINS	1
11A	1042-145	M4 WASHER 4.2X14X0.5	1	26A	14-0130-1370 (PartE)	SHELFWHEEL 137MM	1
12A	14-1115 (PartA)	MOTOR ASSY 31RPM-24VDC	1	27A	14-0571	AGITATOR WITH BUSHINGS	1
13A	14-1100	EXCEL WHEELHOUSING	1	28A	150-020-931 (PartF)	M5 SCREW HX HD.	3
14A	150-010-120	M5X10 SCREW PH. PAN. HD.YELLOW	2	29A	14-0365	HUB SPRING	1
15A	1055-160	M5 WOODWASHER YELLOW	2	30A	150-010-223-7	M5X10X13 SCREW PH.HD.FLANGE NICK	1

NR.	MIN	MAX	Part A	Part B	Part C	Part D	Part E	Part F	Part G	Part H	Part J
-XX	mm	mm	motor	knife	Outlet cov.	pinwheel	shelfwheel	M5 Screw	Met. Supp.	cup liner	Coin Deflectot
-1	18.0	18.9	14-1115	14-0281	14-0065	14-0116	14-0130-1505	150-020-931	not used	not used	14-0095
-	19.0	20.0	14-1115	14-0281	14-0065	14-0116	14-0130-1465	150-020-931	not used	not used	14-0095
-8	20.1	22.0	14-1115	14-0281	14-0065	14-0116	14-0130-1425	150-020-931	not used	not used	14-0095
-12	22.1	24.8	14-1115	14-0281	14-0065	14-0115	14-0130-1370	150-020-931	not used	not used	14-0095
-2	24.9	25.8	14-1115	14-0281	14-0065	14-0115	14-0130-1350	150-020-931	not used	not used	14-0095
-5	25.9	27.8	14-1115	14-0281	14-0065	14-0115	14-0130-1310	150-020-931	not used	not used	14-0095
-3	27.9	31.0	14-1115	14-0281	14-0066	14-0115	14-0130-1235	150-020-931	not used	14-0145	14-0095
-7	31.1	31.9	14-1115	14-0281	14-0066	14-0112	14-0130-1235	150-020-931	not used	14-0145	14-0095
-9	32.0	33.0	14-1135	14-0281	14-0066	14-0112	14-0130-1205	150-020-931	not used	14-0145	14-0095
-10	33.1	35.0	14-1135	14-0295	14-0067	14-0112	14-0130-1165	150-020-522	14-0580	14-0145	14-0095
-6	35.1	36.9	14-1135	14-0295	14-0067	14-0012	14-0130-1125	150-020-522	14-0580	14-0145	14-0095
-4	37.0	38.0	14-1135	14-0295	14-0067	14-0112	14-0130-1075	150-020-522	14-0580	14-0145	14-0096

Configuration for Euro coins:

5 € cent (21.25 mm)	Part no.
Pinwheel 16 pin for diameter from 18.0 - 22.0 mm	14-0116
Shelfwheel 142,5mm for coins 20.1 - 22.0 mm	14-0130-1425
Knife for coins 18.0 - 33.0 mm (metal insert)	14-0281
Motor 24 VDC 31 RPM	14-1115
Outlet cover for coins 18.0 - 27.8 mm	14-0065

10 € cent (19.75 mm)

Pinwheel 16 pin for diameter from 18.0 - 22.0 mm	14-0116
Shelfwheel 146.5mm for coins 19.0 - 20.0mm	14-0130-1465
Knife for coins 18.0 - 33.0 mm metal inserts	14-0281
Motor 24 VDC 31 RPM	14-1115
Outlet cover for coins 18.0 - 27.8 mm	14-0065

20 € cent (22.25 mm), 50 € cent (24.25 mm) and 1 € (23.25mm)

Pinwheel 15 pins for diameter from 22.1 - 31.0 mm	14-0115
Shelfwheel 136.5mm for coins 22.1 - 24.8	14-0130-1370
Knife for coins 18.0 - 33.0 mm metal inserts	14-0281
Motor 24 VDC 31 RPM	14-1115
Outlet cover for coins 18.0 - 27.8 mm	14-0065

2 € (25.75 mm)

Pinwheel 15 pin for diameter from 22.1 - 31.0 mm	14-0115
Shelfwheel 135.0mm for coins 24.9 - 25.8mm	14-0130-1350
Knife for coins 18.0 - 33.0 mm metal inserts	14-0281
Motor 24 VDC 31 RPM	14-1115
Outlet cover for coins 18.0 - 27.8 mm	14-0065

Configuration for US coins:

Nickel (21.21mm)

Pinwheel 16 pin for diameter from 18.0 – 22.0mm	14-0116
Shelfwheel 142,5 for coin 20.1 – 22.0mm	14-0130-1425
Knife for coins 18.0 –33.0mm metal inserts	14-0281
Motor 24 VDC 31 RPM	14-1115
Outlet cover for coins 18.0 – 27.8mm	14-0065

Quarter (24,23mm)

Pinwheel 15 pin for diameter 22.1 – 31.0mm	14-0115
Shelfwheel 136,5 for coin 22.1 – 24.8mm	14-0130-1370
Knife for coins 18.0 –33.0mm metal inserts	14-0281
Motor 24 VDC 31 RPM	14-1115
Outlet cover for coins 18.0 – 27.8mm	14-0065

Dollar token (37.2mm)

Pinwheel 12 pin for diameter from 18.0 – 22.0mm	14-0112
Shelfwheel 107,5 for coin 37.0 – 38.0mm	14-0130-1075
Metal Knife for coins 18 –38mm	14-0295
Motor 24 VDC 21 RPM	14-1135
Outlet cover for coins 33.1>	14-0067
Cup liner for standard cup, used for coins >27.9mm	14-0145
Cup liner for wide and narrow cup, used for coin >27.9mm	14-0855
Metal star on agitator for coins >33.1mm	14-0580

Hopper denomination conversions

Pinwheels:	Part no
16 pin for diameter from 18.0 - 22.0 mm	14-0116
15 pin for diameter from 22.1 - 31.0 mm	14-0115
12 pin for diameter from 31.1 - 38.0 mm	14-0112

Shelfwheel:

107.5 mm / coins 37.0 - 38.0 mm	14-0130-1075
112.5 mm / coins 35.1 - 36.9 mm	14-0130-1125
116.5 mm / coins 33.1 - 35.0 mm	14-0130-1165
120.5 mm / coins 32.0 - 33.0 mm	14-0130-1205
123.5 mm / coins 27.9 - 31.9 mm	14-0130-1235
131.0 mm / coins 25.9 - 27.8 mm	14-0130-1310
135.0 mm / coins 24.9 - 25.8 mm	14-0130-1350
136.5 mm / coins 22.1 - 24.8 mm	14-0130-1370
142.5 mm / coins 20.1 - 22.0 mm	14-0130-1425
146.5 mm / coins 19.0 - 20.0 mm	14-0130-1465
150.5 mm / coins 18.0 - 18.9 mm	14-0130-1505

Motors:

Motor 12V DC 31 RPM / coins 18.0 - 33.0 mm	14-1110
Motor 12V DC 21 RPM / coins 33.1 - 38.0 mm	14-1130
Motor 24V DC 31 RPM / coins 18.0 - 33.0 mm	14-1115
Motor 24V DC 21 RPM / coins 33.1 - 38.0 mm	14-1135

Coin deflector:

Coin deflector	14-0095
Coin deflector coated	14-0096

Knifes:

Knife for coins 18.0 - 33.0 mm	14-0281
Metal knife for coins 18.0 - 38.0 mm	14-0295

Outlet covers:

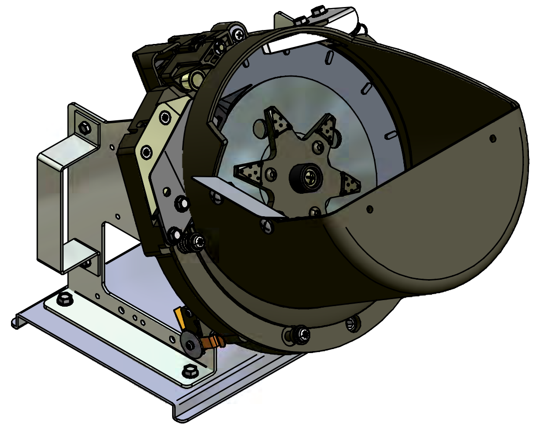
Outlet cover for coins 18.0 - 27.8mm	14-0065
Outlet cover for coins 27.9 - 33.0 mm	14-0066
Outlet cover for coins 33.1 - 38.0 mm	14-0067

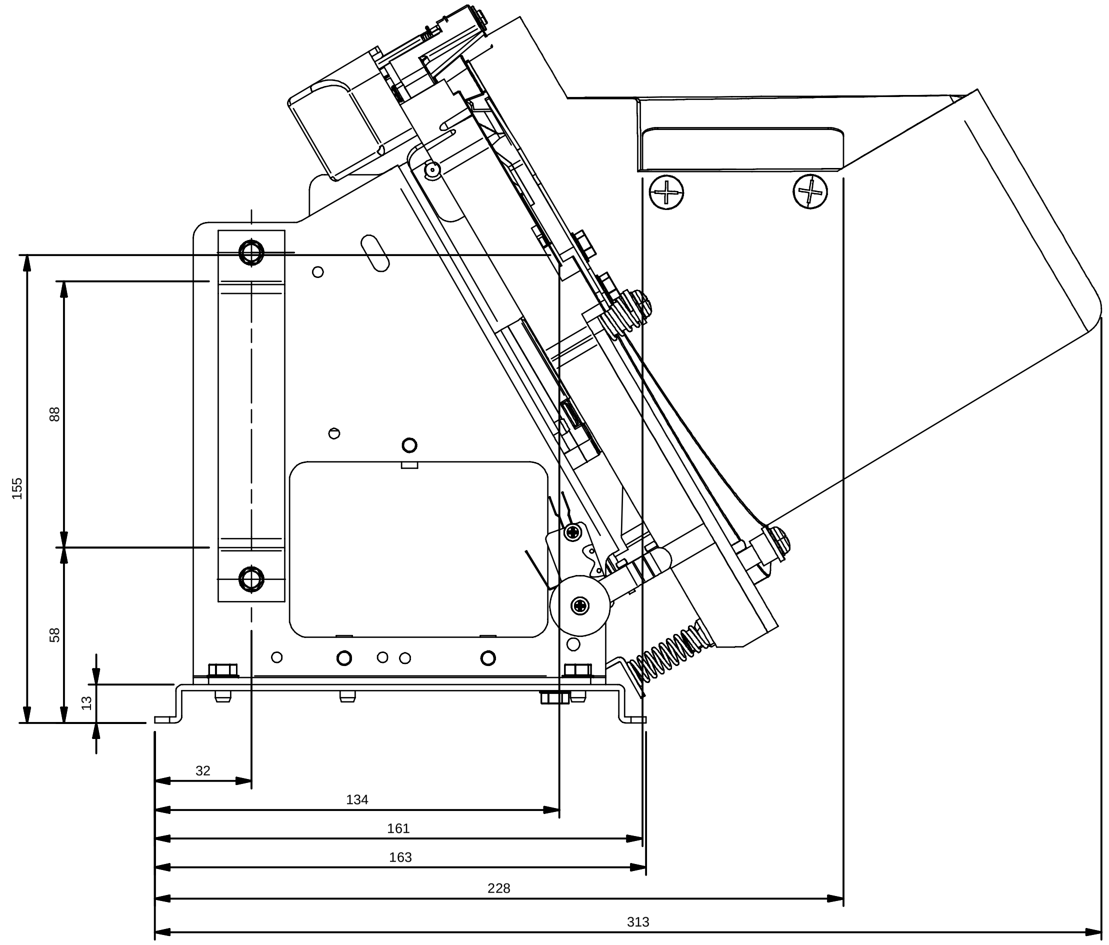
Cup liners:

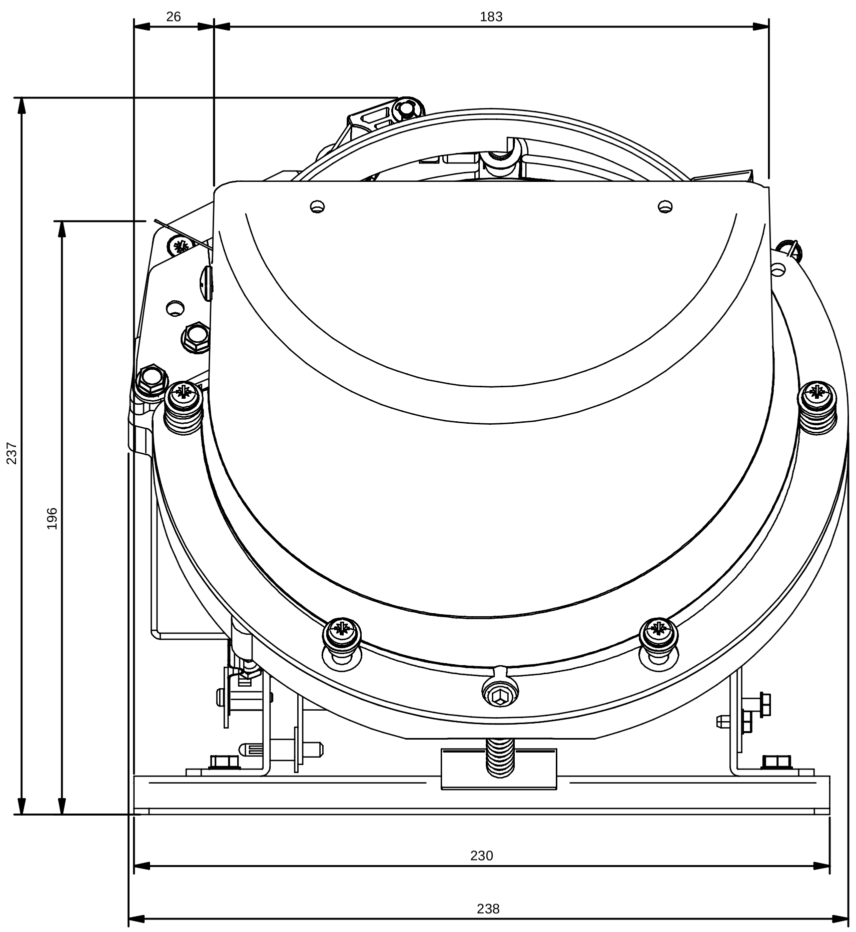
For standard cup, coins >27.9 mm	14-0145
For wide and narrow cup, coins >27.9mm	14-0800

Agitator:

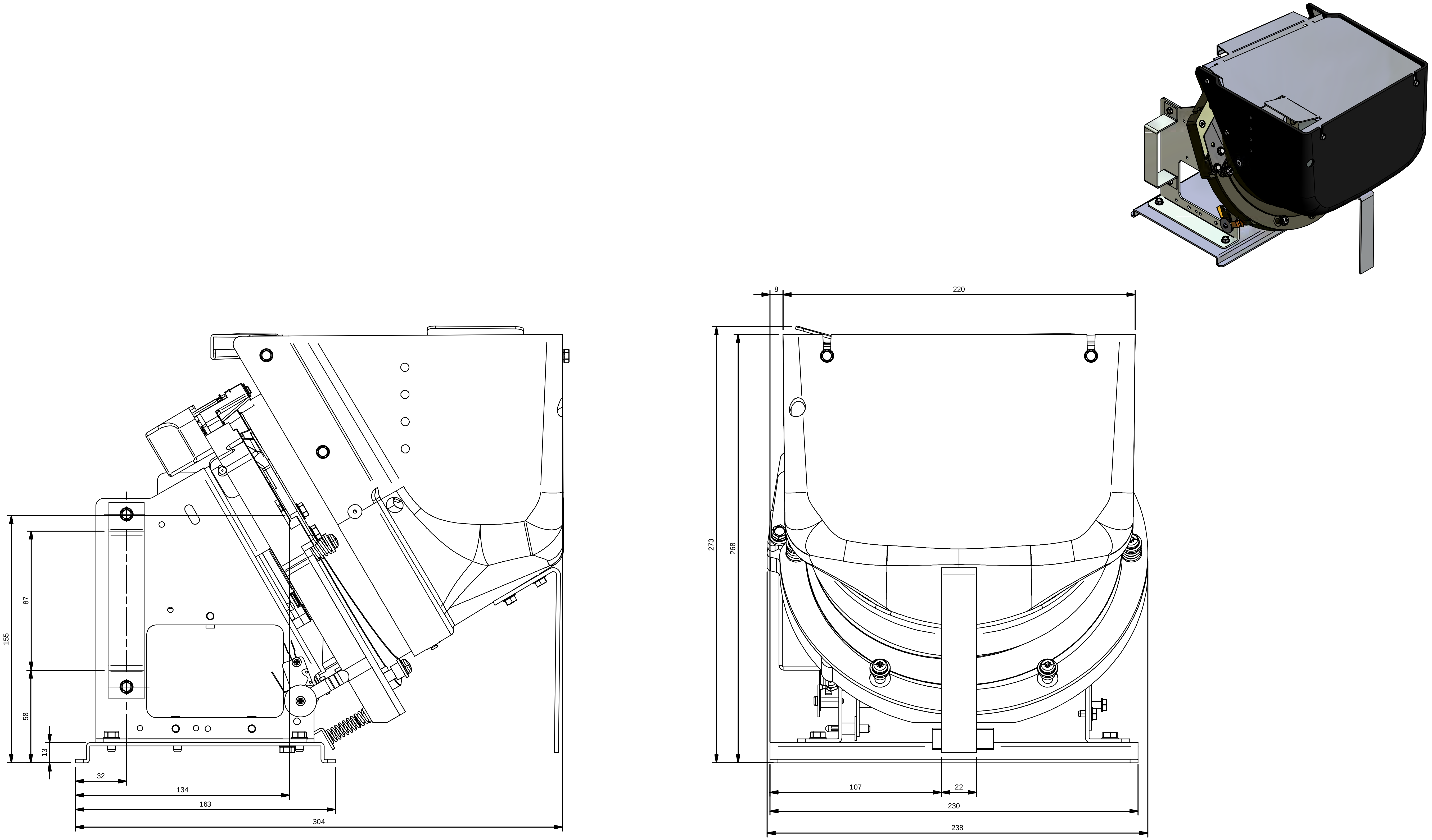
Standard rubber agitator	14-0571







SUZO HAPP® GAMING, AMUSEMENT AND INDUSTRIAL COMPONENTS				Suzo International (NL) BV Antonie van Leeuwenhoekstraat 9 3261 LT Oud Beijerland Tel. +31 (0)186-643333 Fax. +31 (0)186-643355 E-mail info@suzo.com
Description: Excel Hopper Standaard	Date: 2-3-2005	Partnumber:	Revision: 00	Size: A3



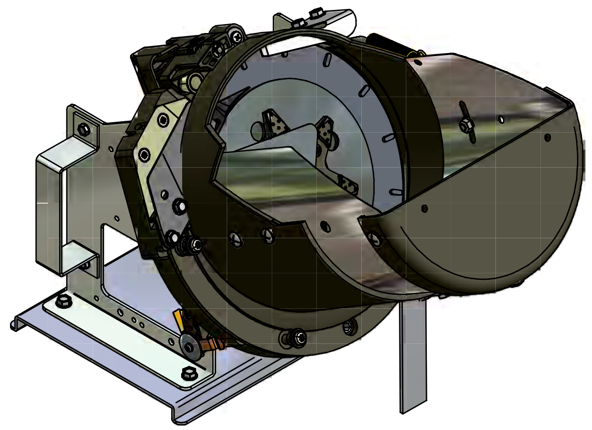
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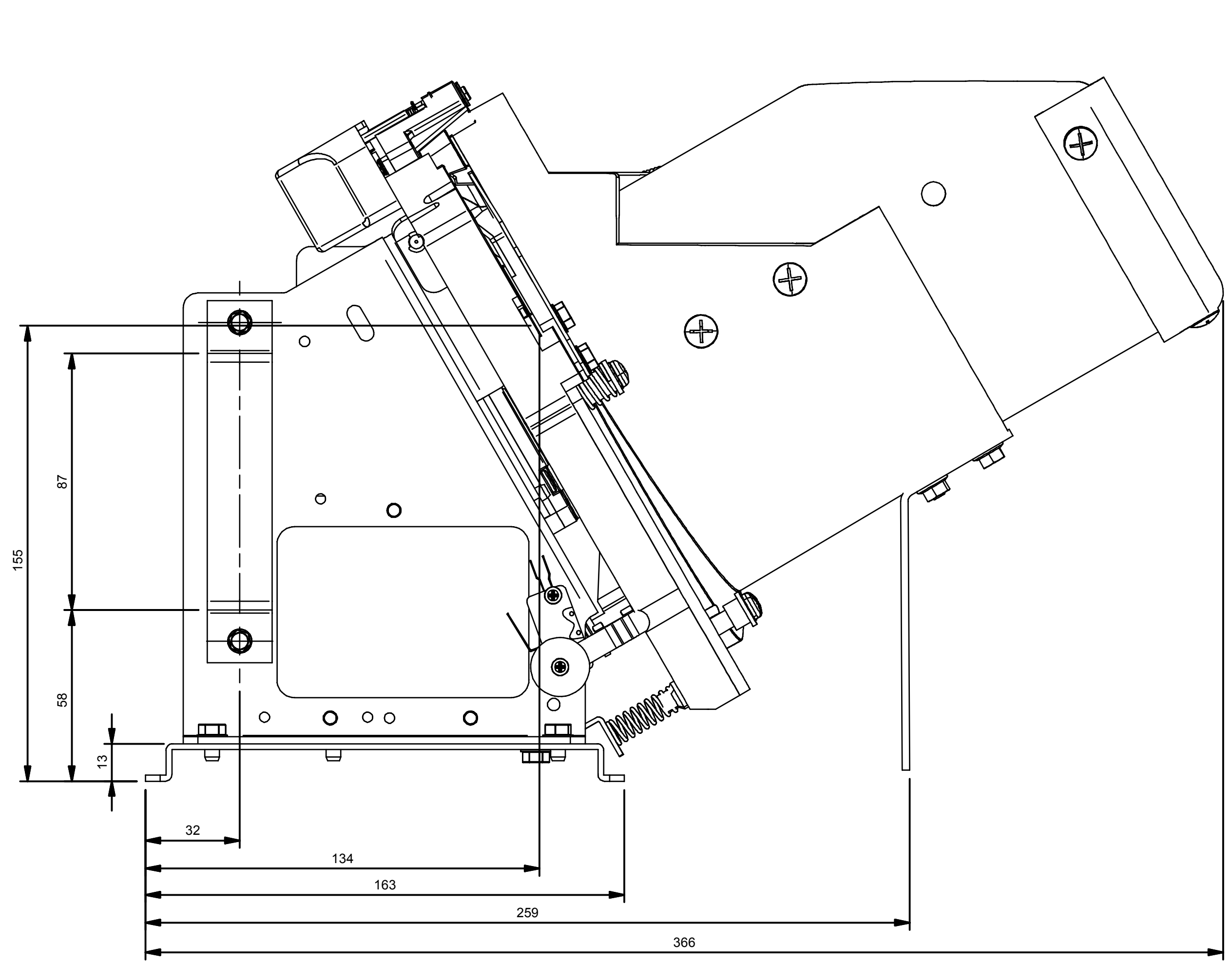
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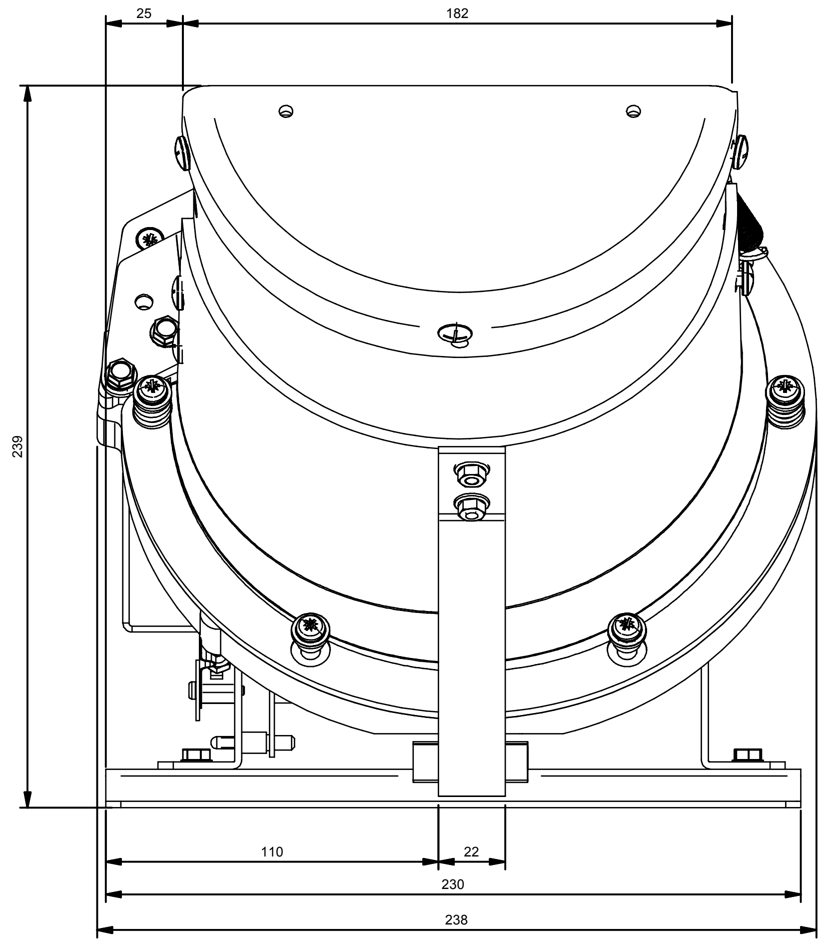
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Description:	Date:	Partnumber:	Revision:	Size:
Excel Hopper Narrow cup	2-3-2005		00	A3







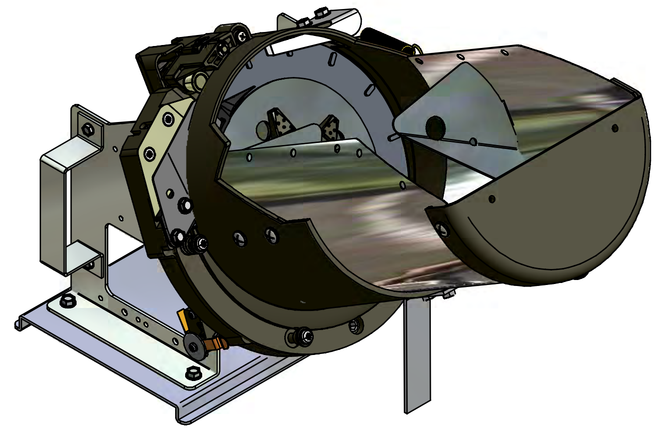
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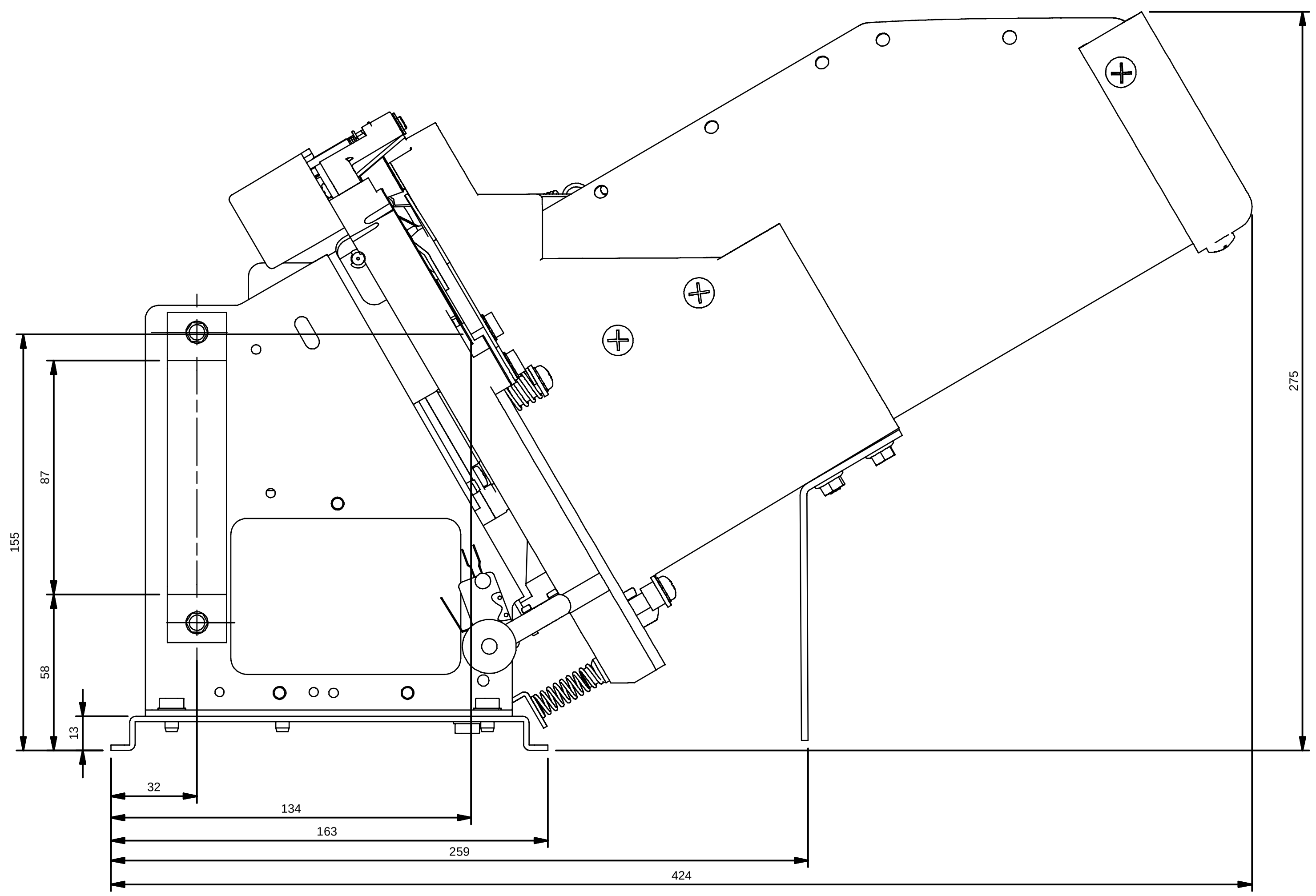
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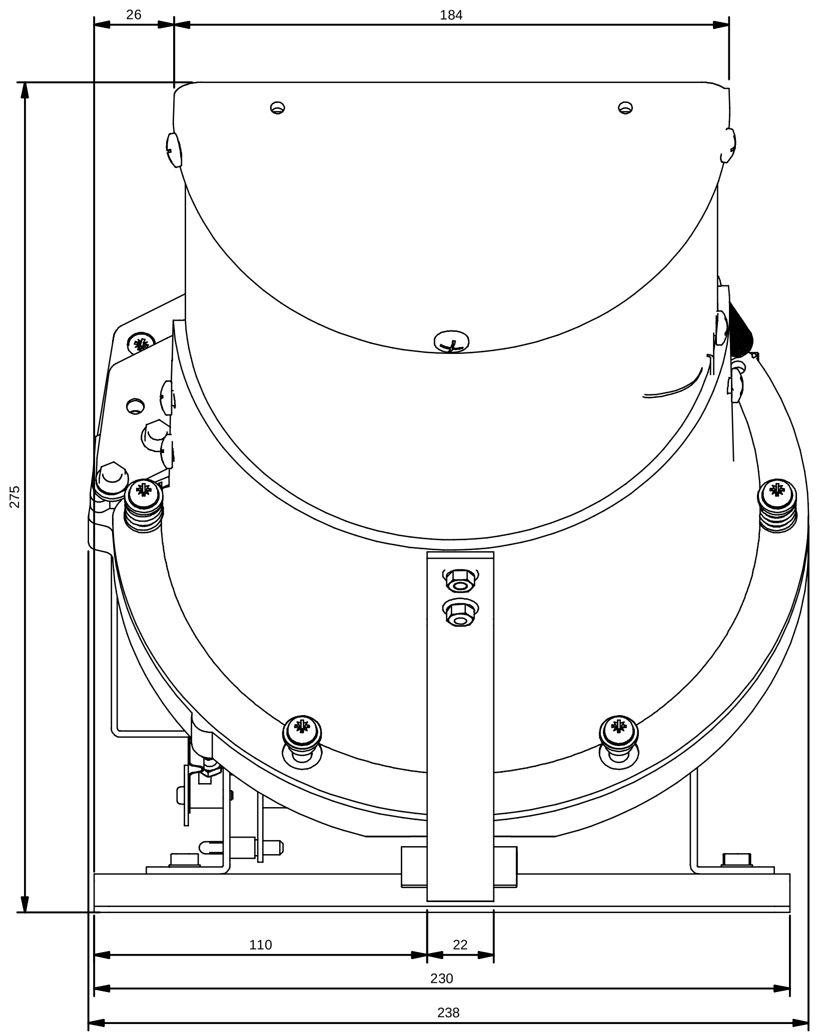
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Description:	Date:	Partnumber:	Revision:	Size:
Excel Hopper Medium cup	2-3-2005		00	A3



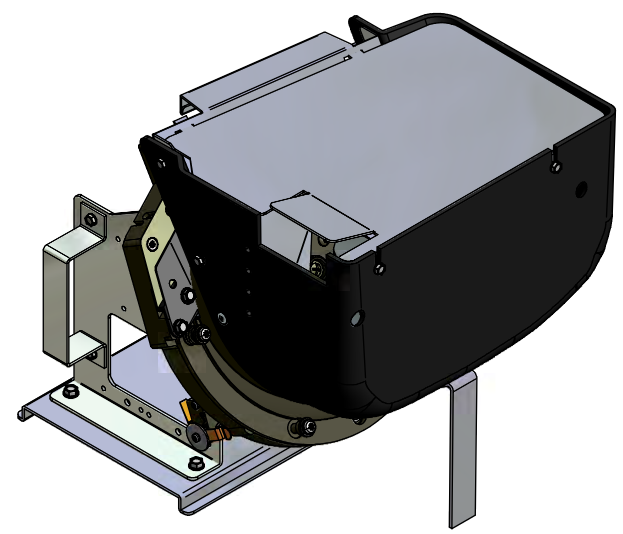


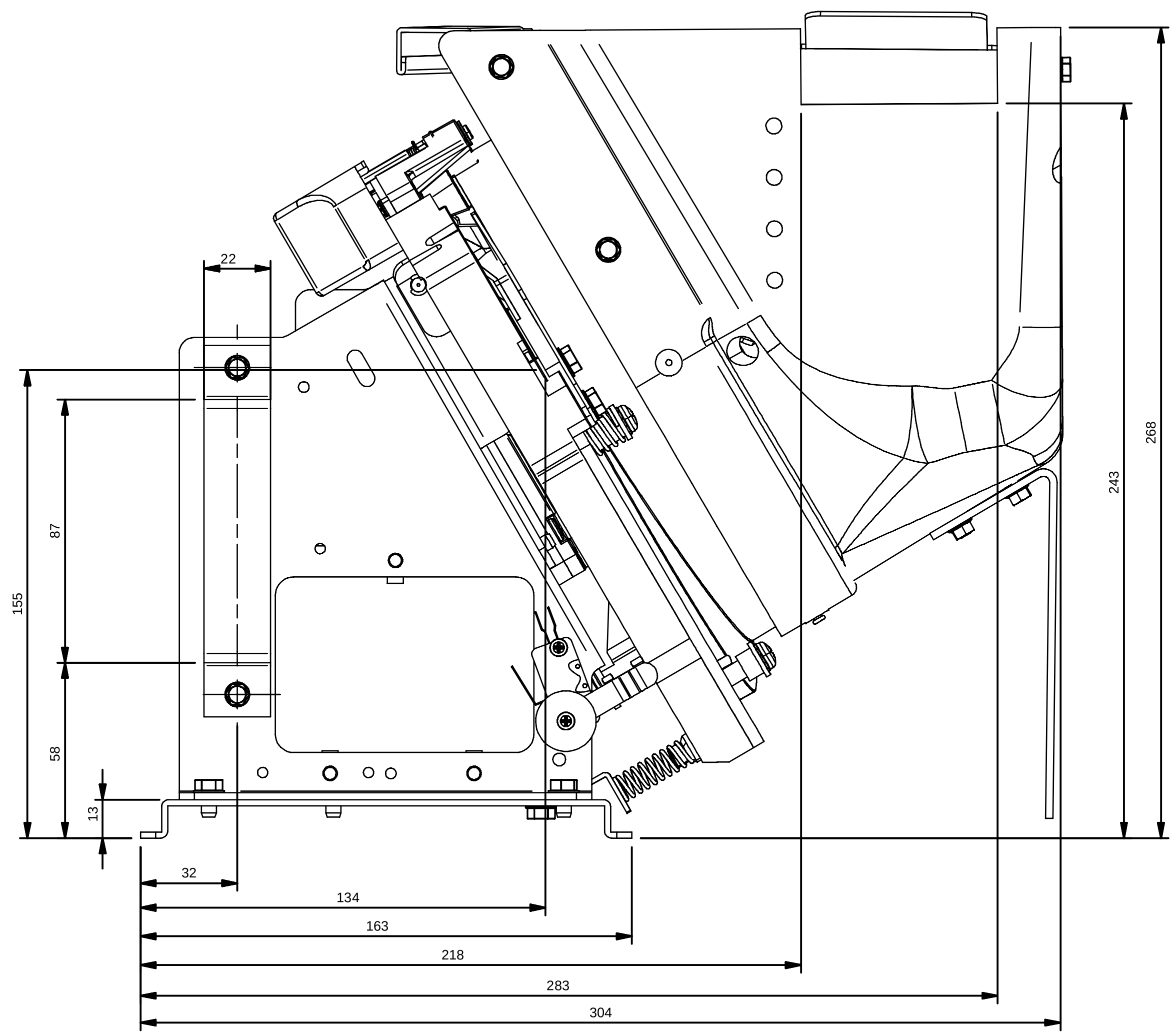


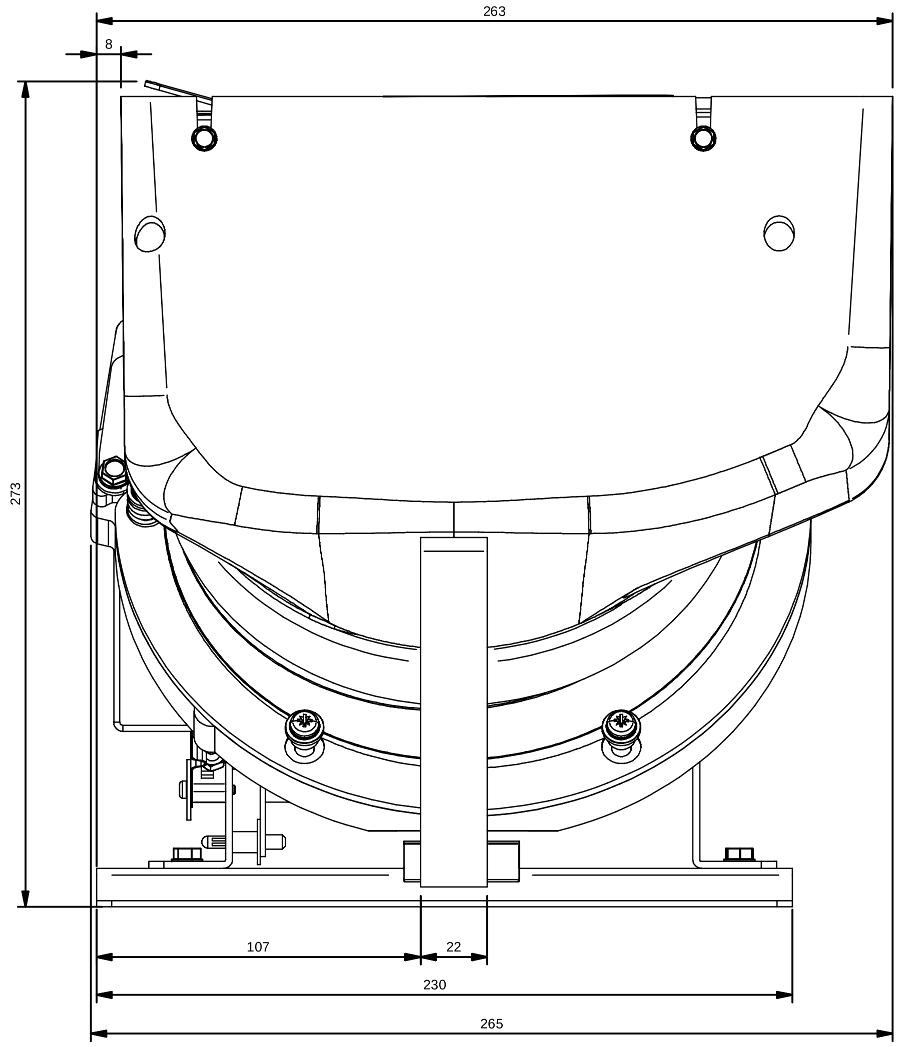
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Description:	Date:	Partnumber:	Revision:	Size:
Excel Hopper Extended cup	2-3-2005		00	A3







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Description:	Date:	Partnumber:	Revision:	Size:
Excel Hopper Wide cup	14-12-2005		00	A3

Excel Hopper Electrical and Functional Specification

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1. Hardware description PCB 14-0530

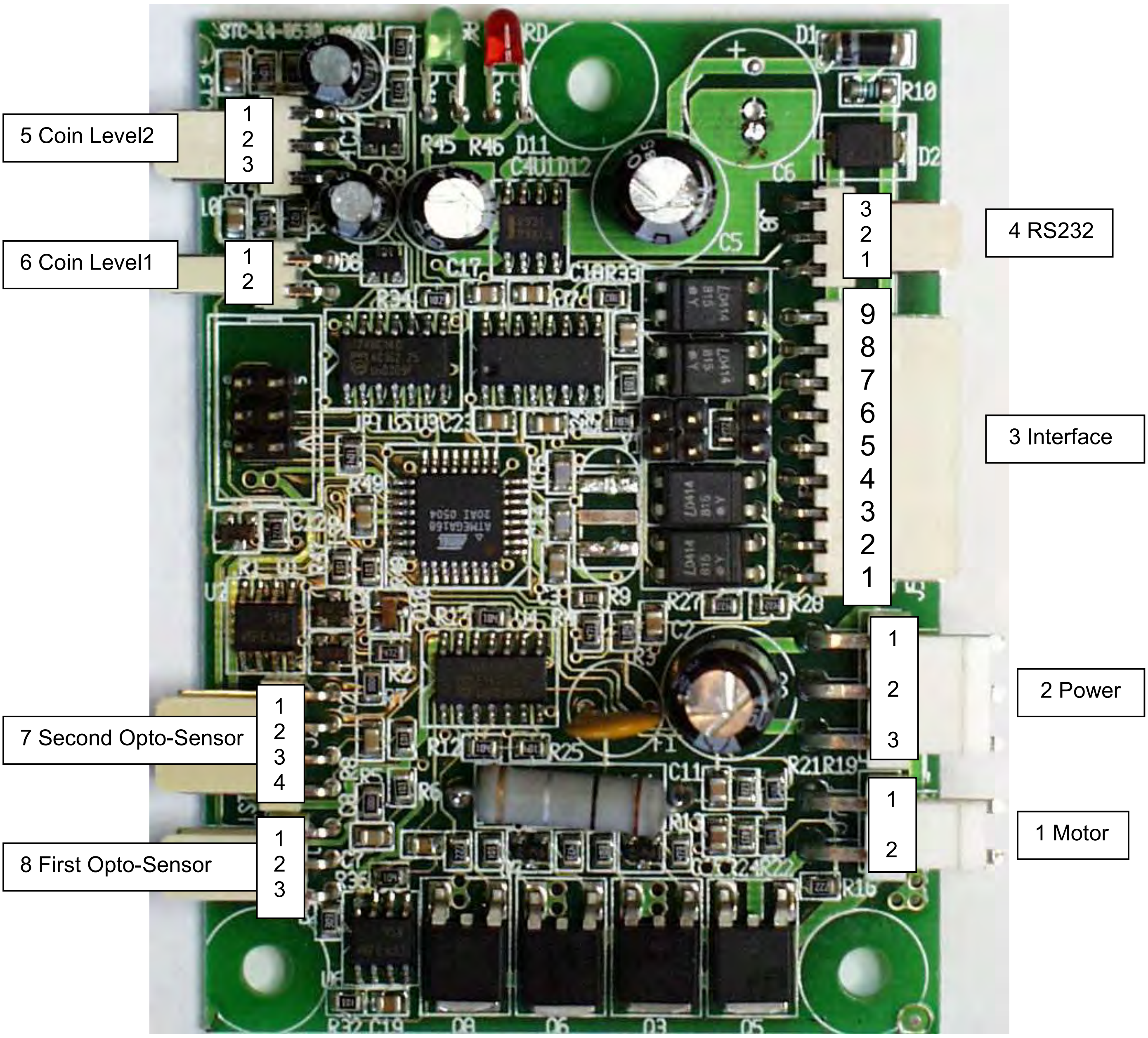


Figure 1: 14-0530 PCB

1.1 Power supply

Voltage for 12V motor hoppers : min 11V and max 27V.
Voltage for 24V motor hoppers : min 21V and max 27V.
Continuous current supply : 2.5A
Peak current supply : 5A

1.2 Connectors

See Figure 1.

1.2.1 Motor connector

2-pin JST connector that connects to the hopper motor.

1.2.2 Power connector

PCB connector type : JST type B3PS-VH
Machine connector type: JST type VHR-3N

Pin	Description	Value
1	Power	min 11 – max 27 Volt
2	No contact	
3	Ground	

Table 1: Power connector

Power requirements: I_continuous = 2.5 Amp, I_peak = 5 Amp.

1.2.3 Interface connector

PCB connector type : Molex type 22-05-7098
Machine connector type: Molex type 22-01-2095, crimp terminal type: 08-50-0032

Pin	Description	Value
1	Level1 sense pin	low level: < 1V, high level: > 4V
2	Level2 sense GND	0V
3	Start input	low level: < 1V, high level: > 4V
4	Mode input	low level: < 1V, high level: > 4V
5	Error output	open collector
6	Coin exit output	open collector, onboard pull-up by shorting JP3
7	Power 12Vdc – 24Vdc	min 11Vdc, max 27Vdc
8	Power Ground	0V power
9	Signal Ground	0V signal ground for opto-isolated inputs

Table 2: Interface connector

1.2.4 RS232 connector

PCB connector type : Molex type 22-05-7038
Machine connector type: Molex type 22-01-2035, crimp terminal type: 08-50-0032

Pin	Description	Value
1	TxD	Output, RS232 level
2	RxD	Input, RS232 level
3	Gnd	Gnd

Table 3: RS232 connector

1.2.5 Coin Level2 connector

PCB connector type : Molex type 22-05-7038
Machine connector type: Molex type 22-01-2035, crimp terminal type: 08-50-0032

Pin	Description	Value
1	level2 sense	Output, < 1V low, > 4V high
2	Gnd	Gnd
3	No contact	

Table 4: Coin Level2 connector

1.2.6 Coin Level1 connector

PCB connector type : Molex type 22-05-7038
Machine connector type: Molex type 22-01-2035, crimp terminal type: 08-50-0032

Pin	Description	Value
1	level1 sense	Output, < 1V low, > 4V high
2	Gnd	Gnd

Table 5: Coin Level1 connector

1.2.7 Second opto-sensor connector

PCB connector type : Molex type 22-05-7038
Machine connector type: Molex type 22-01-2035, crimp terminal type: 08-50-0032

Pin	Description	Value
1	Opto-diode	Output, < 1V low, > 4V high
2	Gnd	Gnd
3	Sense	Input, < 1V low, > 4V high
4	Opto-emitter	Input, < 1V low, > 4V high

Table 6: Second opto-sensor connector

1.2.8 First opto-sensor connector

PCB connector type : Molex type 22-05-7038
Machine connector type: Molex type 22-01-2035, crimp terminal type: 08-50-0032

Pin	Description	Value
1	Opto-diode	Output, < 1V low, > 4V high
2	Gnd	Gnd
3	Opto-emitter	Input, < 1V low, > 4V high

Table 7: First opto-sensor connector

1.3 Jumpers

JP1	JP2	Mode
Shorted	Shorted	Direct drive
Open	Open	Logic drive
Open	Shorted	Reserve

Table 8: JP1 and JP2 Jumper setting

1.4 Indicators

After a power up, the software version number is displayed on the 2 leds:
Green led: First version number
Red led : Second version number
Example : V1.3: Green led flashed 1x, Red led flashes 3 times after a power up.

During normal operation the green led is on when the coin exit output is low, and off when the coin exit output is high.
The red led is on when an error event occurred, and goes off when the error is gone.

2. Suzo Excel functional software specification

Excel Hopper types:

14-0530-1: Motor 24V started active high
14-0530-2: Motor 24V started active low
14-0550-1: Motor 12V started active high
14-0550-2: Motor 12V started active low

The hopper can be operated in 2 modes:

1. Direct mode (JP1 and JP2 shorted)
2. Logic mode (JP1 and JP2 open)

2.1 Start Input

- When the hopper is in Direct mode, the hopper will start as soon as power is applied to the hopper, and stop as soon as the power is removed from the hopper.

- When the hopper is in Logic mode, the hopper is started by setting an active high level (model 14-0530-1 and 14-0550-1) of 5 to 24Vdc at the start input, or an active low level (model 14-0530-2 and 14-0550-2) of 0V.

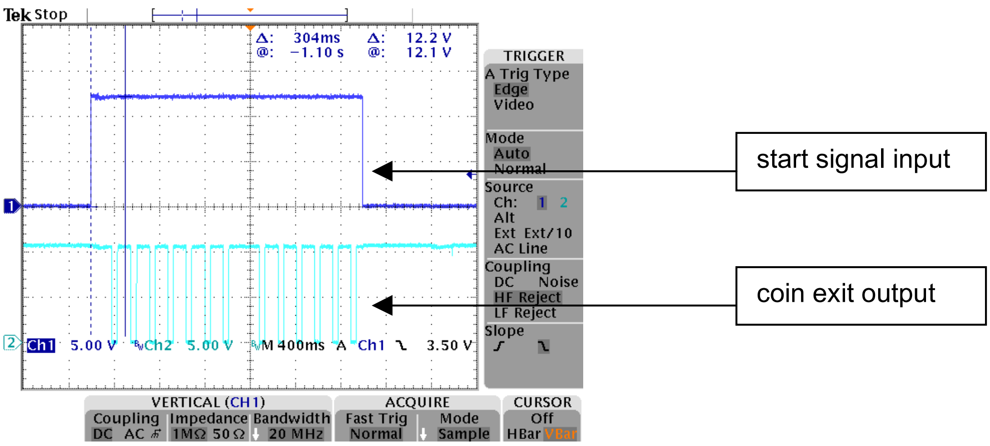


Figure 2: Start signal active high (model 14-0530-1 and 14-0550-1)

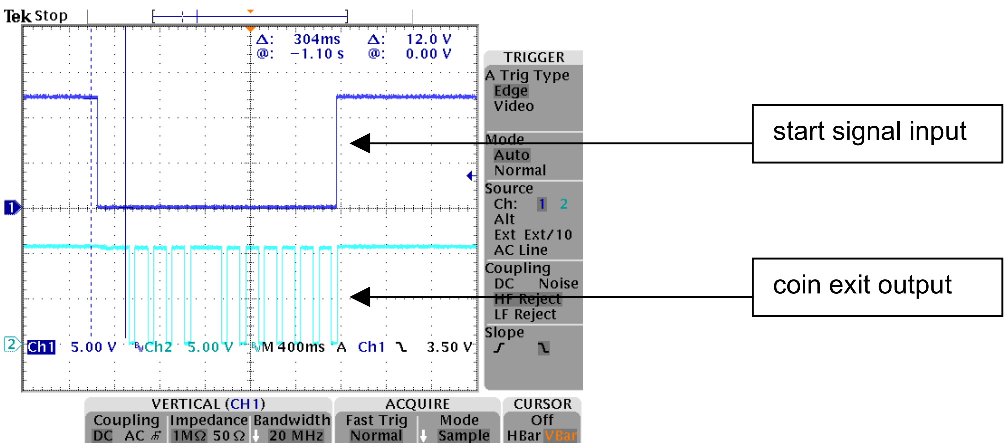


Figure 3: Start signal active low (model 14-0530-2 and 14-0550-2)

- For the 14-0530-2 and 14-0550-2 model, jumper JP3 may be shorted to enable an onboard pullup resistor of 4K7 ohm.
- Note that the start level must be lower than 1 volt in order to change input state from high to low.
- The hopper will not start if the (optional) second sensor is blocked, until the second sensor becomes deblocked.

2.2 First opto coin sensor

- When the first opto is blocked for more than 500ms, the hopper will stop if it was running, and will reverse and restart for 2 seconds to try to unblock the opto-sensor. If after 2 seconds, the opto is still blocked, the hopper will stop and go into error state (red led on). However, the hopper can be re-started again.

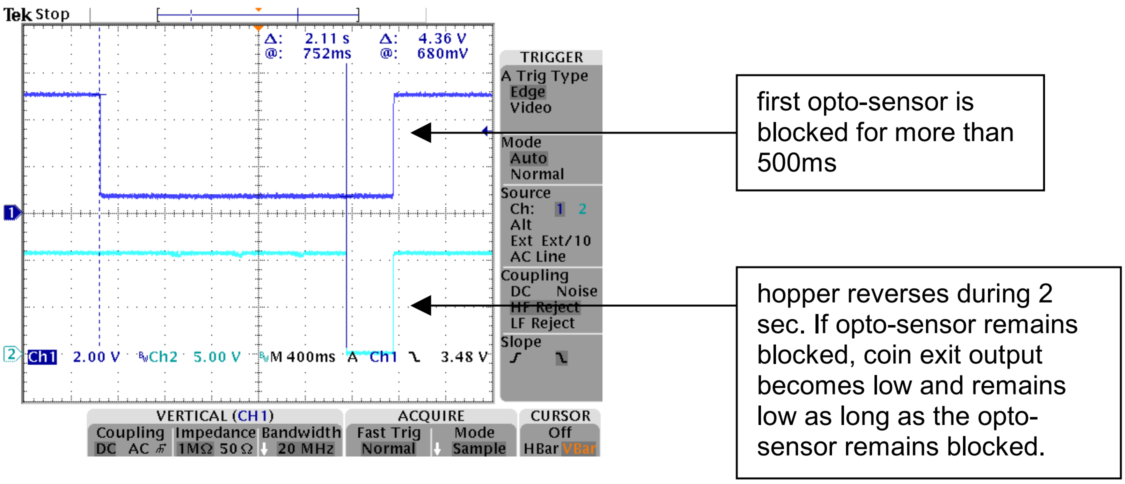


Figure 4: Coin exit output when first opto-sensor is blocked

2.3 Coin Exit Output

- If a coin passes the 1st opto sensor (active low signal), a fixed active low pulse of 50 ms is put on the coin exit output.

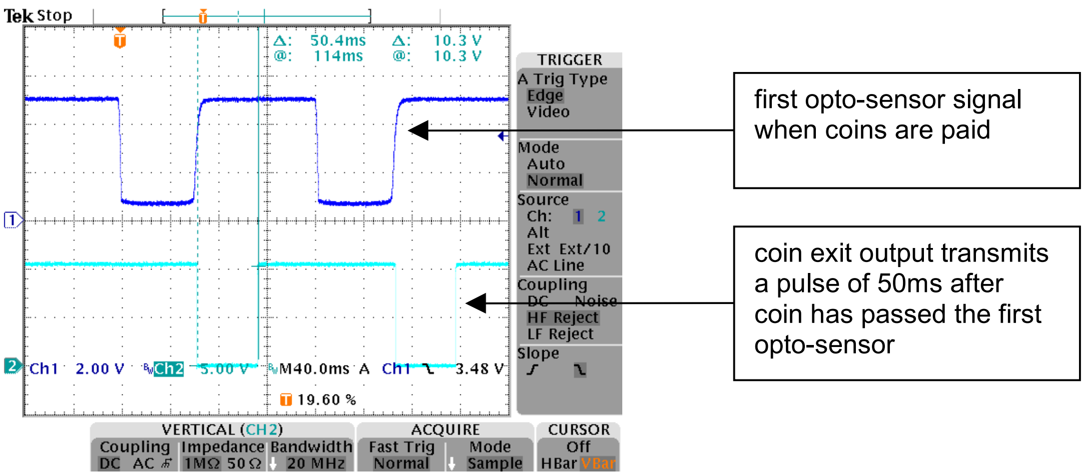


Figure 5: A fixed pulse of 50ms is output at the coin exit output if a coin passes the first opto

- If the hopper is stopped with a coin in the first opto, the hopper will reverse momentarily so that the coin is thrown back into the cup. No coin exit signal is transmitted in this situation.

2.4 Second Opto option

When a 2nd coin opto sensor (article nr.14-1190) is attached to the excel hopper, more security is added to the hopper.
- When the excel hopper is blocked for more than 120 ms at the coin exit port, the second opto will be blocked also, and the hopper will stop.
- If the 2nd opto-sensor becomes deblocked within 2 seconds, the hopper will continue to payout.
- If the 2nd opto-sensor is blocked for more than 2 seconds, the hopper will stop and go into error state and a COIN_JAM_PULSE is send to the error output.
- If more than 3 coins are in between the 1st opto sensor and the 2nd opto-sensor, the hopper will stop, until the second opto-sensor detects the passing of a coin.
- The hopper can not be re-started if the 2nd opto is blocked for more than 2 seconds. As soon as the second-opto is clear again, the hopper can be restarted again.

2.5 Error Output

If an error event occurs, a pulse is transmitted on the error output.
The following error pulse signals are defined:

- Coin jam at second opto: COIN_JAM_PULSE (250 ms)
- Coin overpay at second opto: COIN_PAID_TILT (300ms)
- Run away detected at second opto: RUN_AWAY_TILT (350ms)
- Power down event: POWER_DOWN_TILT (500 ms)

A 10% variation in the timing is possible.
Note that only the first error signal is transmitted in case more errors have occurred in a hopper (no more than 1 error pulse is transmitted at the same time).

- If the first opto-sensor is blocked for more than 500ms, the hopper reverses 3 times trying to unblock the sensor. If the opto remains blocked, the error output becomes low and remains low as long as the first opto is blocked with a minimum time of COIN_JAM_PULSE (250 ms).

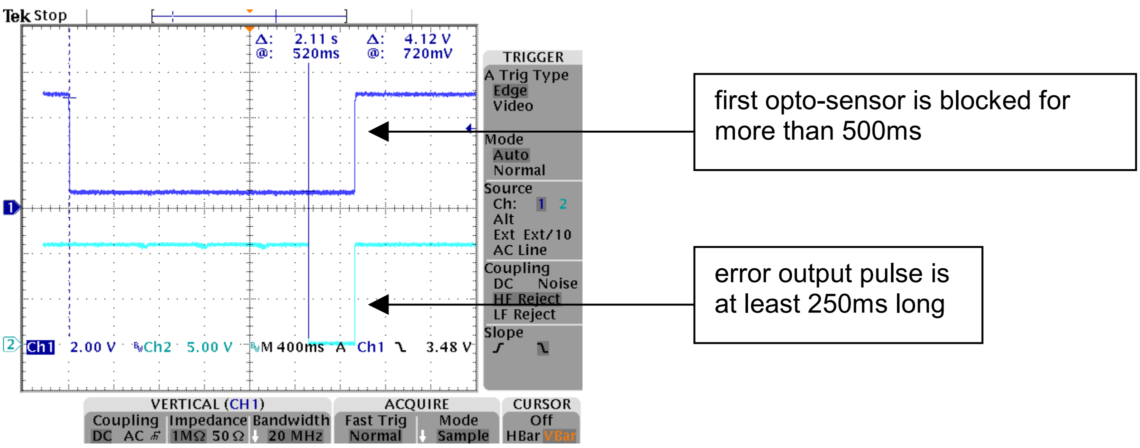


Figure 6: Error output when first opto-sensor is blocked

2.6 Anti-Jam operation

- If the hopper becomes blocked, the hopper will stop and and shake the pin wheel for 2 times (100ms reverse followed by 200ms forward followed by 200ms reverse), and then the hopper will try to start payout again. After 10 seconds of continuously anti-jamming, the hopper will stop and cool-down for 5 seconds and then try again.

2.7 Power down

A power down event occurs when the power voltage level drops below:
- 8V for a 12V (PCB 14-0550) board.
- 15V for a 24V (PCB 14-0530) board.

The motor will stop in all modes as soon as a power down event (50 ms after power threshold) is detected.

2.8 Power up

A power up event occurs when the power voltage level rises above:
- 10V for a 12V (PCB 14-0550) board.
- 20V for a 24V (PCB 14-0530) board.

The motor will restart in all modes as soon as a power up event is detected, and the start signal is still present.

- Coin exit (blue line) and Error (green line) should be high after power up.

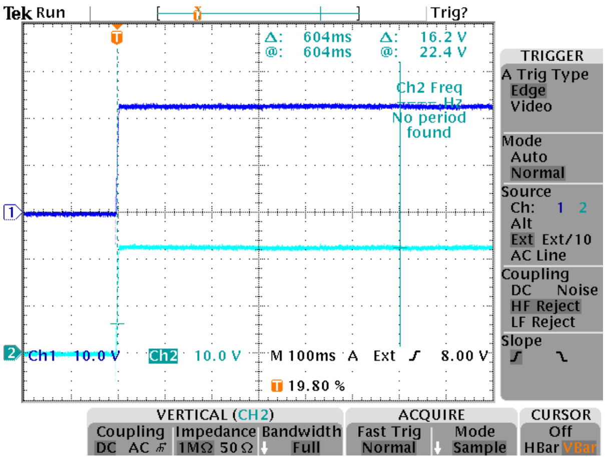


Figure 7: Coin exit output and Error output after power up

Schematic Diagram PCB 14-0530 Rev0.3

